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ON STRICTURE OF THE URETHRA.

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ON

STRICTURE OF THE URETHRA:

INCLUDING AN

ACCOUNT OF PERINEAL ABSCESS, URINARY FISTULA
AND INFILTRATION OF URINE.

BY

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TO

JAMES WILLIAM CUSACK, M.D. M.R.I.A.

SURGEON IN ORDINARY TO THE QUEEN IN IRELAND; PRESIDENT
OF THE ROYAL COLLEGE OF SURGEONS, ETC. ETC.

THIS VOLUME IS DEDICATED

AS A

MARK OF AFFECTION AND RESPECT,

BY

THE AUTHOR.

994

P R E F A C E .

THE fact that a vast number of books has been written on urinary affections—more perhaps than have appeared on any other class of disease—many of them, too, having emanated from authors of the highest professional celebrity, may naturally create a doubt as to the advantage of making any addition to the works that exist on the subject. Those, however, who are fully acquainted with the literature of that part of urinary diseases which it is the special object of the present volume to treat, are aware that there has been but little written thereon in a systematic, comprehensive, and (if we may be allowed the phrase) satisfactory form. The larger works which treat of urinary diseases in general seldom devote much consideration to stricture of the urethra, and leave practical details for the most part unnoticed; while many of the monographs, some of which are truly valuable, having sprung from the pen of the best authorities, have been offered to the profession with

an acknowledgment of their incompleteness, the intention on the part of the writers being in most instances to expound some particular part of the subject either in theory, practice, or pathology. A few of these, written by very eminent surgeons, have been designed purely for the purpose of elucidating some special or original mode of treatment. Others are merely works of compilation. Even the admirable book of Sir Benjamin Brodie, from which has been gathered so large a supply of practical instruction, is composed of clinical lectures with which completeness and systematic arrangement are incompatible. Of the same nature is Mr. Guthrie's excellent work, which is "the substance of lectures" delivered by him in the College of Surgeons in England.

Again, much of the best information we possess concerning the pathology, treatment, and consequences of stricture is perhaps to be found in detached articles and reports of lectures diffused through various medical periodicals. Of the published lectures the author may specially mention those which appeared in the *Dublin Medical Press* of the year 1839, by his father, than whom no one devoted more time to the study of this disease, and few attained to greater skill in its treatment.

Hence it is that the field in which the student has to

labour for knowledge on this subject is of wide expanse, and if he desire to thoroughly glean it, he must be satisfied to collect its products in fragmentary portions. A practical work, embodying in a small compass all valuable information regarding stricture of the urethra, without being merely a compilation, would doubtless prove a boon to the student, and a source of much convenience to the practitioner. The author is not presumptuous enough to think that the volume now offered to the profession is sufficient to supply this desideratum to the full extent, neither was it his intention to make the effort to accomplish such a task; still he encourages the hope that, limited though it be, it will be found useful, and capable in some degree of meeting the requirements. It has been carefully confined to the subject of stricture of the urethra, no considerations regarding any part of urinary diseases being entered into except such as belong to this special affection. The work pretends to no originality save in the mode of its arrangement, and, it may be, in the manner, in which the materials of its construction are laid out and elucidated. The author's main object has been to render what he has written purely practical; accordingly, whatever matters are introduced relating to theory or pathology are considered only so far as conduce to the illustration of practical details.

An endeavour has been made to arrange the several departments of the subject in such a manner as is best calculated to give practical precision to the whole, and especially to avoid the confusion so often created in the mind of the reader by not bringing the various important points under their appropriate heads.

The following is in general terms the plan of the work in its several sections :—The first chapter treats principally of the divisions of stricture and its pathology ; in it the muscularity of the urethra is considered, for the purpose of explaining certain phenomena witnessed in practice. The subdivision of spasm into the genuine and the spurious, and their classification into the pure, complicated, and mixed, are of practical utility as well as being calculated to give clearness and precision in the study of this part of the subject. In the second chapter we have the situation of stricture considered, its causes and symptoms, the different kinds of urinary fever, and, lastly, the differential diagnosis of stricture. The third is devoted to the complications and pathological results of stricture. The fourth enters into a detailed account of the treatment of the disease upon the principle of absorption. Here a division is made of strictures into yielding and unyielding, according as they obey or resist the bougie ; and this is not only a practical classi-

fication, but more logical and accurate than the ordinary division into “permeable” and “impermeable,” “passable” and “impassable.” The fifth is perhaps the most important chapter ; it embodies what the author has ventured to designate impediments to the cure of stricture by absorption, such as spasm, irritable urethra, rigors, urethral hemorrhage, false passage, &c. A description of these accompaniments of stricture is usually scattered through works on this disease, a circumstance which obviously interferes with a clear and ready recognition of their bearings ; but by collecting them together, and considering them as they relate to the treatment of stricture, their study is simplified, and they are brought at once into the proper light. The sixth chapter deals with the treatment of unyielding stricture ; here the merits and demerits of Mr. Syme’s operation are discussed. The seventh describes retention of urine arising from organic stricture, and the several methods of relieving it. The eighth treats of abscesses in the perineum and of urinary fistula. The ninth gives a detailed account of the symptoms, progress, and treatment of infiltration of urine arising from stricture.

It will undoubtedly strike the reader that there is comparatively little allusion made throughout the book to other writers on the same subject, but such omission

by no means results from a want of appreciation of their merit on the part of the author. To name all who have laboured in this field would indeed be an endless task ; to single out those only who have especially distinguished themselves would be invidious. Besides, much of the practical matter contained in this volume embodies the author's own experience and the conclusions he has arrived at from observation ; while a portion of the classification to be found therein, and the whole arrangement adopted are the result of reflections formed without the aid of any borrowed light.

Dublin, Stephen's-green West,
November 1st, 1858.

CONTENTS.

CHAPTER I.

	PAGE.
Preliminary Remarks.—Definition of stricture.—Division into two varieties.—Arguments in favour of muscularity of the urethra.—Genuine or true spasmodic stricture.—Its divisions.—Strumous urethritis.—Organic stricture.—Its pathology.—Different species of organic stricture.—Congenital contraction.—Excrescences in the urethra.....	1

CHAPTER II.

Situation of Organic Stricture.—Causes.—Arguments in proof that gonorrhœa is a fertile remote cause of organic stricture.—Strumous and gouty urethritis as causes.—Congenital contraction.—Symptoms of stricture.—Rational and sensible evidence.—Constitutional symptoms.—Urinary fever.—Differential diagnosis of stricture.—Diminished and increased power of the bladder sources of deception.—Same states of the urethra have a similar effect.—Various mechanical obstructions to the bougie, not strictures.....	21
---	----

CHAPTER III.

COMPLICATIONS AND PATHOLOGICAL RESULTS OF STRICTURE.—Spasm, two kinds.—Irritability, local and general.—“ Irritable urethra,” its connexion with gout.—Spermatorrhœa.—Pain and tumefaction of the prostate gland ; chronic enlargement of the organ.—Calculus.—Swelling and tenderness of the testis and epididymis.—Hydrocele.—Morbid changes in the urethra, bladder, ureters, and kidneys	45
--	----

CHAPTER IV.

PAGE.

TREATMENT OF STRICTURE.—Yielding and unyielding strictures.—Principle of cure.—Difficulties encountered in the management of small instruments.—Absorption of stricture by contact without penetration.—“Vital dilatation” a wrong term.—Employment of force condemned.—Extent to which dilatation of the urethra should be carried.—Strictures liable to relapse.—Secondary chronic systitis.....	67
--	----

CHAPTER V.

IMPEDIMENTS TO THE CURE OF STRICTURE ON THE PRINCIPLE OF ABSORPTION.—Spasm.—“Irritable urethra.”—Rigors ; their different kinds.—Urethral hemorrhage.—False passages.—Sympathetic testitis.—Irritable bladder.....	88
--	----

CHAPTER VI.

TREATMENT OF UNYIELDING STRICTURE.—Method of effecting ulceration of stricture.—Destruction of stricture by caustic : nitrate of silver : potassa fusa.—Internal division of stricture.—Sir B. Brodie’s modification of Stafford’s operation.—Division of stricture at the orifice of the urethra.—Division of stricture through the perineum.—Ordinary operation.—Mr. Syme’s operation ; its merits and demerits discussed	112
---	-----

CHAPTER VII.

RETENTION OF URINE.—From acute urethritis.—From organic stricture, superaddition of spasm the chief cause.—Symptoms and progress of complete retention.—Mechanical and remedial means of relieving it.—General conclusions.—“Forcing stricture.”—Opening the urethra behind a stricture.—Paracentesis vesicæ.....	133
---	-----

CHAPTER VIII.

ABSCESS IN PERINEO AND URINARY FISTULA.—Difficulty of detecting matter in the perineum.—Two varieties of perineal abscess.—

CONTENTS.

xv

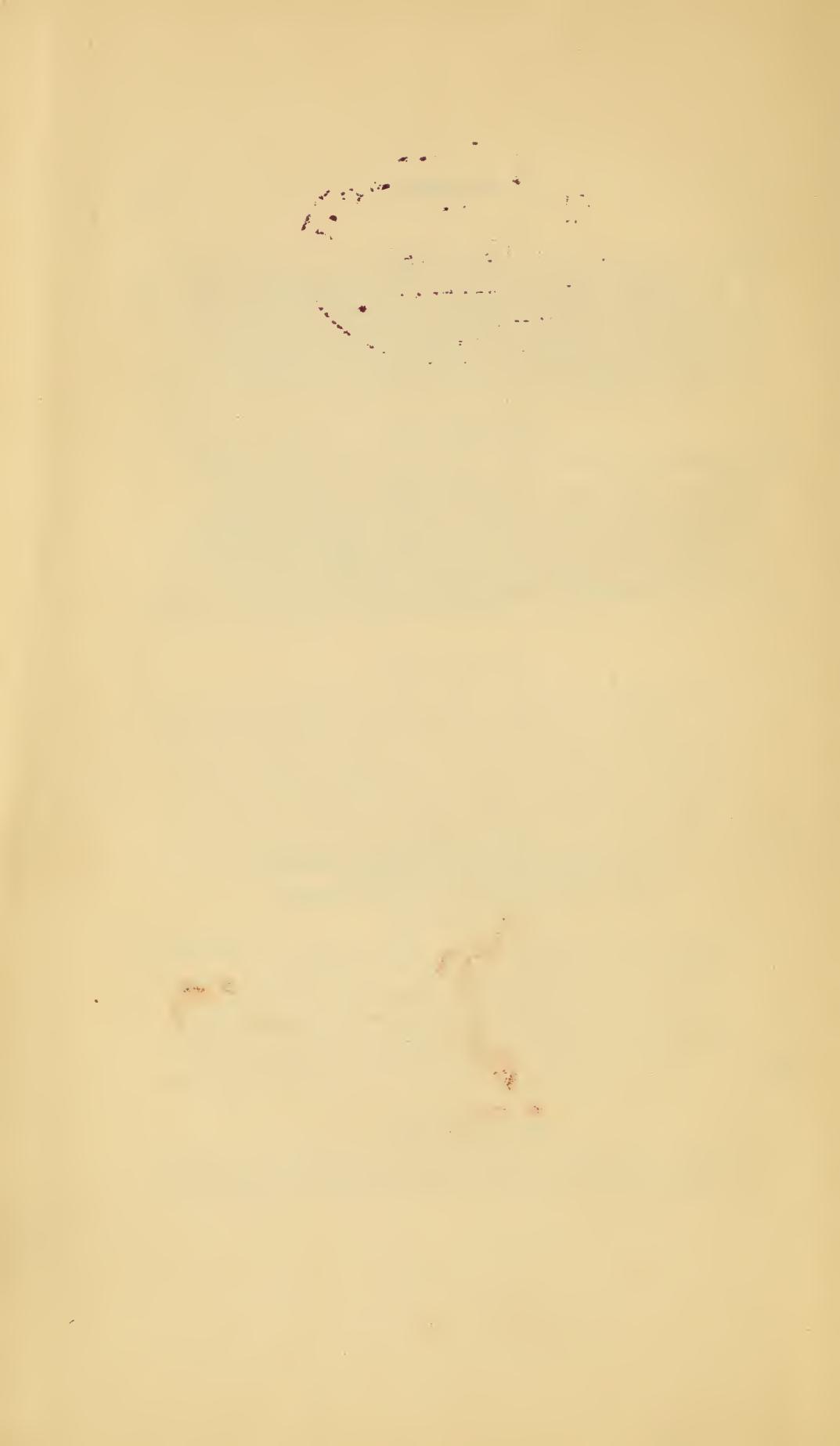
	PAGE.
Simple or sympathetic form.—True urinary abscess, circumscribed and diffused.—Sloughy urinary abscess.—Abscesses connected with the bladder.—Treatment of perineal abscesses.—Urinary fistula.—Fistula from fractured ramus of the pubes.—Complication of fistula with urethral calculus.—Treatment.....	161

CHAPTER IX.

INFILTRATION OF URINE.—From ulceration of the urethra behind stricture.—Symptoms of infiltration, local and constitutional.—Infiltration from urethral calculus.—From rupture of the urethra, the result of falls and blows.—From false-passage.—Gangrenous erysipelas of the scrotum confounded with infiltration of urine.—Diagnosis.—Treatment.—Rupture of the bladder.....	192
--	-----

ERRATA.

- Page 18, line 2, for *fibrous stricture*, read *fibrous structure*.
 " 54, " 20, for *lithotrihy*, read *lithectasy*.
 " 141, " 18, for *he is to be kept*, read *it is to be kept*.





STRICTURE OF THE URETHRA.

CHAPTER I.

Preliminary remarks.—Definition of stricture.—Division into two varieties.—Arguments in favour of muscularity of the urethra.—Genuine or true spasmodic stricture.—Its divisions.—Strumous urethritis.—Organic stricture.—Its pathology.—Different species of organic stricture.—Congenital contraction.—Excrescences in the urethra.

URINARY diseases, whether viewed with regard to the frequency of their occurrence, the suffering they produce, the evil consequences they entail, or the mental disquietude they necessarily create, are alike worthy of study, and must be deemed as not second in importance to any other class of cases the practitioner is called on to treat. Their importance is further enhanced practically by the amenability of most of them to surgical treatment. The affections of that part of the urinary apparatus which come more expressly within the domain of the physician are, many of them, obscure in diagnosis and unsatisfactory as to treatment; but what may in contradistinction be termed the surgical diseases of the urinary organs are, with few exceptions, equally easy of recognition and obedient to a proper system of management.

Let us consider the immediate and complete relief afforded by the introduction of a catheter in retention of urine, by an incision in the deep perineal abscess ; how impending destruction is averted by the adoption of prompt measures in infiltration of urine ; not to speak of the decisive manner in which stricture, fistula, and the many serious results of obstructive disease of the urethra may be cured. On the other hand, if a class of cases be sought calculated the most to enlist sympathy and excite pity, do we not find a vivid example of such where an unhappy sufferer is sinking slowly under urinary hectic fever, in which the body becomes emaciated, the mind enfeebled, the individual loathsome to himself and those around him, and this endured without his experiencing a ray of that delusive hope which in the hectic of tubercular phthisis deceives the reason and thus strips approaching death of its terror ?

Why the male urethra should be so liable to obstructive disease is a question which has given rise to much conjecture. Seeing that this canal is the outlet for the urine from the bladder, the channel for the final discharge of a fluid which, if not expelled, death must soon result from the interference offered to its excretion by the kidneys, it is natural to suppose that it should be endowed with peculiar exemption from disease, as it undoubtedly is with a high degree of sensibility, which leads to its harmonious consent with the action of the bladder, and thus insures the accomplishment of the main object for which this part of the urinary apparatus is designed. John Hunter, it is well known, maintained that the

double office which the urethra is called on to perform predisposes it to disease. This statement, while it casts a slur on the wisdom of the Creator, in whose every work such admirable perfection, adaptation, and design are observable, is founded on false reasoning, and receives denial by a reference to facts. It is true that if the male urethra were intended merely for the transit of the urine from the bladder, a canal of much greater simplicity would answer the purpose, as in the case of the female ; and it is obvious that the construction which is essential to render it subservient to the generative function—the narrowness of the canal, its possessing a curve, its being furnished with muscles, and the addition to it of an erectile tissue—necessarily aggravates the effects of disease in it to a very great extent. But the physical arrangement here alluded to, which fits the urethra for the performance of what may be called its secondary duty, in no respect predisposes it to disease ; it may continue to discharge its double office for years without suffering impairment, unless certain conditions, to be hereafter mentioned, for the production of morbid change of structure, be brought into operation. Again, if the subserviency of the urethra to the generative function be a predisposing cause of disease in it, then morbid changes ought to be found in that part of the canal particularly which is most concerned in the function of generation ; yet such is not the case, for while strictures may occur at any point of the urethra, their most frequent seat is in or about the membranous portion, which chiefly ministers to the process of micturition. But though it cannot

be allowed that the mere multiplication of duty imposed on the urethra renders it prone to disease, it must not be forgotten that its complicated and delicate construction, its length, narrowness, curve, muscularity, and varying condition as to vascular turgescence, greatly increase, as already observed, the evils resulting from morbid alterations in it, and therefore demand corresponding care and delicacy in the treatment that should be adopted for their cure.

The definition usually given of stricture of the urethra is so vague as to afford no pathological or sufficiently comprehensive idea of the nature of the disease. It is often defined simply as a "narrowing" or "contraction" of some portion of the canal; thus the effect of tumors of all kinds in the perineum, abscesses, extravasated blood, displacement of the ramus of the pubis from fracture by exercising pressure on the urethra at one spot, ought all to come under the denomination of stricture. The most comprehensive though by no means perfect definition is perhaps the following, *a narrowing of the urethra, the result either of spasmodic action of muscular fibres or of inflammatory action, whereby the stream of urine from the bladder suffers a proportionate reduction in its size.* This definition embraces the grand division of strictures into two varieties, the temporary and permanent. The temporary variety is sub-divided into the spasmodic and the inflammatory. Spasmodic stricture is caused, as its name implies, by the contraction of muscular fibres, and is of two distinct kinds—one feeble and imperfect, resulting

from the action of the minute involuntary muscular fibres, which have been demonstrated by the microscope to extend along the entire course of the urethra—the other strong and complete, from the action of the voluntary muscles which surround the membranous portion of the canal. The first kind of spasmodic stricture it will be necessary to consider at some length, since many have doubted its reality, and even denied the existence of the muscular tissue to which its production is referred.

Many years ago John Hunter advanced the doctrine of the muscularity of the urethra; but his opinion was altogether inferential, being based on the phenomena presented by the normal and abnormal actions of the canal. Sir Everard Home warmly embraced similar views, which were subsequently corroborated by the researches of the distinguished microscopist Bauer. At this time, however, the microscope as an optical instrument was imperfect; hence many errors were made by Bauer, especially as to the exact locality of the muscular fibres. But within the last few years, a period marked by such rapid progress in microscopic research, clear demonstrative proof has been furnished of the possession by the urethra of minute involuntary muscular fibres throughout its extent; and to Kölliker and Hancock is undoubtedly due the credit of having pointed out whatever is now accurately known of the situation, distribution, and other particulars of these fibres. The following is Hancock's description of the course the fibres take. After pointing out the manner in which the prostate gland receives a covering of organic muscular fibres, he

says: "From the front of the prostate the conjoined layer of organic fibres passes forwards to the bulb, investing the membranous portion of the urethra, covered by but distinct from the common muscles of the part ; the latter being inorganic, voluntary, or striated ; these being organic and nucleated. Arrived, however, at the bulb, these two layers again part company, and extend forwards through the whole length of the spongy portion of the urethra, the internal layer running between the corpus spongiosum itself and the urethra, but separated from the latter by areolar tissue ; the external lying on the outside of the corpus spongiosum, separating the proper spongy tissue from its fibrous investment. Upon reaching the anterior extremity of the urethra, these two layers again unite, and form a circular body or band of organic muscular fibres, constituting that peculiar structure usually denominated the lips of the urethra, and which had been previously considered by Mr. Guthrie as surrounded by a peculiar dense structure, analogous to that which forms the edge of the eyelid, and which he believed was requisite to maintain the patency of the opening : so that not only have we the urethra supplied by a coat of organic or involuntary muscular fibre, but the spongy body itself lies between its two layers of involuntary muscle, an arrangement doubtless of very great importance in relation to the due performance of the functions of the part."

Now if any value is to be attached to the revelations of the microscope, brought as it has been to such optical perfection, and worked with such untiring energy as that

displayed not alone by Kölliker and Hancock, but Quekett and others no less distinguished, it is impossible to deny that muscular fibres enter into the composition of the urethra. But then comes the important question, how far the action of the organic muscular tissue can lead to spasmodic occlusion of the canal. Can muscular fibres so minute as to require for their demonstration a high magnifying power, and much skill and experience in microscopic research, produce an independent and limited constriction of the urethral canal to any decided extent, similar to what is supposed occasionally to occur in the intestinal canal? Admitting fully the organic muscularity of the urethra, which must play so important a part in the process of micturition and generation, it certainly does not necessarily follow that its action is capable of producing spasmodic stricture in the true sense of that word.

Let us examine this point. The ordinary illustrations brought forward in support of the muscularity of the urethra are, the contractile and expulsive force exercised by the canal on bougies and catheters introduced into it, particularly the powerful tightening on the instrument so often experienced in certain forms of stricture, as well as the effect observed where stimulating fluids are injected. Now, unfortunately for the settlement of this vexed question, all these phenomena can be readily explained without referring them to muscular contraction; hence many eminent authorities, who have not believed in the existence of an organic muscular tissue belonging to the urethra, have ascribed them variously to the

effects of mere elasticity, "vital contractility," turgescence of the lining membrane, and to the action of the erectile tissue. And undoubtedly, if the advocates of Hunter's doctrine were to rest, as he did, their conclusions on these phenomena alone, the muscularity of the canal could not be satisfactorily established. The fact, however, that the urethra is furnished with minute organic muscular fibres has been, as already observed, of late years proved to demonstration by the microscope, and it only accords with reason and analogy to believe that a limited contraction of these fibres can take place, causing an annular stricture at any point of the canal. That so partial a spasmotic contraction of such delicate muscular fibres cannot produce a very forcible closure of the canal is, however, obvious; and indeed it would appear that this kind of stricture is rather of physiological interest than of practical importance. Generally the contraction of the organic muscular fibres is uniform throughout the extent of the canal, leading to a condition of the highest practical importance, as will be seen in a future chapter.

The second kind of spasmotic stricture, that resulting from contraction of the compressores urethræ, which are voluntary muscles, can alone cause effective closure of the canal, so that the statement of Sir Benjamin Brodie, that spasmotic stricture is only met with in the membranous part of the urethra, though not exactly correct, may be considered in a practical sense fully true. This kind of spasmotic stricture may be termed *genuine or true*, in contradistinction to the other which we may call the *spurious*. The true it will be convenient to divide

into three forms—the pure, the complicated, and the mixed. Pure spasmotic stricture is extremely rare; it implies the production of spasm without any appreciable local lesion. Such are examples of “centric” spasmotic action, the irritation causing it having its origin in the nervous centres: it is easy to conceive, however, with what ease morbid irritation in the urethra may elude detection, and which, though slight, may be capable of exciting perfect reflex action, particularly in systems of high nervous mobility. I have almost invariably found that where urethral spasm has at first appeared to be of the pure character, close investigation has revealed some irritation or “morbid sensibility” in the canal, or some source of sympathetic disturbance of the muscles, either in the urine, bladder, prostate gland, or rectum; and where especially the slightest irritation exists within the urethra, the mere influence of the mind, derangement of the digestive organs, and various other remote causes will lead to spasm. Nevertheless, there are a few cases recorded by distinguished and trustworthy authors which prove that pure spasmotic stricture may occur. One such case is mentioned by Mr. Guthrie, where a gentleman was twice seized over a period of several years with retention of urine from spasmotic action of the compressores urethræ muscles, without there being the slightest evidence of irritation in the urethra. Those cases, however, in which violent spasm of the compressores urethræ arises from a long-continued effort to resist the evacuation of the bladder, should not be viewed as examples of pure spasmotic stricture. The

second form of spasmodic stricture—the complicated—is common ; by it is meant the combination of spasm with some local morbid condition which is capable of calling the reflex action into play ; hence this may be termed “eccentric” in contradistinction to the “centric” or pure form. The sources of this sort of spasmodic stricture are numerous. A concentrated state or excessive acidity of the urine, by unduly stimulating the lining membrane of the urethra, will cause it. Gouty persons are chiefly prone to spasmodic stricture arising from this source, owing to excess of lithic acid or its products in the urine ; and where such state of the renal secretion persists long, we not unfrequently find it leading to a highly irritable condition of the lining membrane of the canal, which proves an additional cause of spasm. Occasionally the irritation passes into a minor degree of inflammation as evidenced by puriform discharge. Irritability or “morbid sensibility,” of the urethra from other causes, abrasion of the lining membrane, ulceration and the various forms of chronic urethritis, are all sources of the complicated spasmodic stricture. The most common is “morbid sensibility,” or some chronic inflammation following gonorrhœa. Strumous persons are particularly prone to this sequel of gonorrhœa, and nothing is more annoying to the patient and difficult of management to the surgeon. At one time the urine will be passed in a full stream and without the least difficulty, and a large sized bougie or catheter can be introduced with ease ; at another, often without any assignable cause, though more frequently as the result of wet, cold, fatigue, or

some indiscretion, difficult and painful micturition will set in.

The third form of spasmotic stricture, the mixed, is still more common than the preceding ; it consists in the combination of spasm with permanent stricture, and will be more conveniently considered in connexion with the latter.

The second division of the temporary stricture—the inflammatory—constitutes a most important and a very frequent class of obstructive affections of the urethra ; it presents two forms, the simple and the combined. The first is the effect of thickening of the lining membrane of the canal from acute inflammation ; hence it is generally very transient. The membrane becomes highly vascular and swollen ; there is interstitial deposit of lymph ; but in bad cases the submucous tissue also becomes implicated, the fibrinous deposit extending into it. In these latter cases the obstruction deserves the name of temporary or transient *only* by comparison to the permanent, afterwards to be considered, since the narrowing of the canal is often very slow in disappearing. Sometimes the lymph deposited becomes organised, and thus an obstruction resulting from acute inflammation may glide into a stricture of more or less permanent character. In some cases of urethritis, but they are rare, there is no doubt that an adventitious membrane is effused on the free surface of the lining membrane, similar to what on a large scale occurs on the respiratory mucous membrane in croup, and this of course greatly adds to the difficulty of micturition.

The commonest cause of inflammatory stricture is acute gonorrhœa. In the early stage of this disease, while the membrane is simply vascular and swollen, the caliber of the urethra is rarely diminished to such an extent as to produce any marked impediment to the flow of urine. But when the first stage has passed, if the discharge be suddenly checked, as it too often is by the employment of powerful astringent injections, the vessels on the surface of the mucous membrane are constricted, and as a necessary consequence those beneath engorged, which unload themselves by effusion into the submucous areolar tissue, and thus lead to a proportionate degree of tumefaction.

The second form, the combined, implies the association of spasm with tumefaction of the lining membrane from acute inflammation. Here both sets of muscular fibres, the voluntary and involuntary, are concerned, separately or conjointly ; but since, as we have already seen, spasm of the latter fibres is feeble, when there is perfect occlusion of the canal and consequently complete retention of urine, such result must be due to the action of the compressores urethræ. And of this we have a sufficiently satisfactory proof from the fact that on introducing an instrument in these cases, it is exactly at the spot where the muscles alluded to lie—the membranous part of the urethra—an obstruction is felt. The great fertile source of this two-fold stricture is also acute gonorrhœa, the evil result being brought about by the disease exceeding its specific boundary. The following are ordinary examples of the circumstances under which it occurs :—

An individual, on perceiving the first symptom of gonorrhœa, uses, with a view of cutting short the disease, a caustic injection ; this, if it do not succeed, as is usually the case, greatly augments the inflammation, which, instead of keeping within the specific distance, travels along the urethra to the membranous portion, where the irritation is speedily propagated to the muscles lying in close contact with it, and they are thrown into spasmodic action. A more frequent case is where a patient, having recovered from the acute stage, perceiving that the discharge has greatly diminished, and the scalding and other painful symptoms gone, sees no ground for any longer observing the restraint imposed on his actions ; he resumes his usual habits, takes laborious exercise, and indulges freely in the pleasures of the table. Such a course will, with few exceptions, reproduce the urethral inflammation in full force, and cause it to outstep its specific limit ; it accordingly extends into the membranous portion, and excites the compressor muscles to contraction. In the normal state, these latter, which are also called Wilson's muscles, display sphincteric action ; when the bladder contracts to expel its contents, they relax, and allow the urine to escape ; but where, from a high degree of irritation existing within the membranous portion of the canal, they become unduly stimulated, their consent with the bladder is disturbed. The individual attempts to pass water, but the compressor muscles remain unrelaxed, so that not a drop can escape ; he forces and strains violently, but the more he does so, the more powerfully do these muscles contract.

The two foregoing examples are instances where the stricture here considered is produced by gonorrhœa which has been increased in intensity, and made to transgress the specific distance under the influence of a powerful exciting cause ; but we frequently meet with cases where there is a remarkable tendency to this sort of stricture during the progress of gonorrhœa, notwithstanding the strictest avoidance on the part of the patient of every thing calculated to heighten the urethral inflammation, or cause it to extend. This occurs in persons of a strumous habit, and every practitioner is aware that it is in these cases retention of urine is so apt to take place at every stage of gonorrhœa, owing to the tendency in the disease to lose its specific limitation. But although gonorrhœal urethritis in a strumous subject is the chief cause of the combined inflammatory stricture, other forms of urethral inflammation having no connexion with gonorrhœa will lead to it, and especially that which, in an article written by me a few years ago,* I ventured to term "Strumous Urethritis." As it will be necessary to allude occasionally to this peculiar affection, it may be of advantage to quote the description I have already given of its leading features :—A man complains that he has been annoyed for a long time with a constant discharge of watery matter resembling whey, from the urethra, and a tickling or hot sensation when he passes urine. He states that all the symptoms are heightened when he drinks spirits, has sexual intercourse, or exposes

* See *Dublin Quarterly Journal of Medical Science*, No. XXI February, 1851, page 20.

himself to wet, cold, and fatigue ; and that frequently, without any assignable cause, he is seized with inflammation of the canal, which assumes all the characters of acute gonorrhœa. If we question the patient, he tells us either that he never had gonorrhœa, or if he had, that the interval between the complete cure of the latter, and the supervention of the symptoms now detailed has been so long as to remove the least rational supposition that the one could be the sequel of the other. When we examine the urethra, the first thing which attracts our attention is a pouting of the lips of the orifice, which, however, does not present a circular shape, as in gonorrhœa, but appears flattened laterally, as if it had been tightly compressed between the fingers. If we expand the orifice, the mucous membrane, as far as can be seen, exhibits a highly vascular and granular condition, which can be compared to nothing better than to the palpebral conjunctiva in granular ophthalmia ; and I believe that the same condition occupies the entire length of the canal, as far at least as the bulb. If we introduce a No. 8 bougie or catheter, we find that the patient experiences pain on its first entrance, and all along the passage, but particularly when it arrives at the bulb, where we in general become sensible of a soft spongy obstruction : a little pressure on the instrument, however, will make it surmount what appears to be a slight eminence.

So much for the first variety of stricture of the urethra, the temporary, its subdivision and several forms.

The second variety of stricture, the permanent, is more

common and far more important. It results from chronic inflammatory action, which works slow changes in the lining membrane of the urethra and the tissues outside it, that eventuate in the formation of an adventitious structure which narrows the canal. The agent here in active operation is lymph or fibro-plastic material that becomes converted into a fibrous texture; hence the permanent stricture is also termed organic. In the formation of this stricture the first appreciable change that occurs is increased vascularity of the lining membrane of the urethra, which also becomes soft and pulpy, and loses its natural degree of elasticity. At this period no decided obstruction exists, so that a full-sized instrument will pass with ease; but, unless very gently handled, more or less bleeding will result. By degrees interstitial deposit of lymph takes place in the mucous membrane and submucous tissue, and a fold or puckering is thus formed which encroaches on the canal. In cases that are neglected the formation of the adventitious material advances, and becomes more perfectly developed as time goes on, and eventually lymph comes to be deposited in the cells of the corpus spongiosum, causing the worst and most intractable kind of stricture. When the latter tissue is the seat of deposit, the mucous and submucous tissues are also involved, but these may be engaged without the former. Where all are concerned, the extent to which each is involved differs greatly in the several cases met with in practice, thus leading to peculiarities in strictures which will be hereafter noticed. In the smaller number of instances the effusion of lymph takes place on

the free surface of the lining membrane, by which the canal becomes immediately narrowed. This change is generally the effect of acute inflammation, as has been already observed, and is then only temporary; since, being inorganizable, the lymph is readily thrown off, as in the analogous instance of croup. There is no doubt, however, that chronic or at least subacute inflammation occasionally leads to effusion of lymph in the same situation that it becomes organized, and produces permanent stricture. We meet with three principal species of permanent or organic stricture—the chorded, the long, and the bridle. The first consists of a fold or plait of mucous membrane, and generally submucous tissue also, in which lymph has been interstitially deposited; it usually lies transversely on the floor and sides of the canal, in a crescentic form, and does not as John Hunter has represented encircle it. It is generally met with in the membranous part of the urethra, and does not occupy more than a line's breadth; in its simplest form the obstruction is exclusively composed of the mucous membrane. During life we recognise it by the circumstance that an instrument introduced along the urethra gives a sudden jerk as it passes over the obstruction. A modification of this sort of stricture is sometimes met with in the shape of a membranous septum—a regular diaphragm, stretched across the canal, with a small aperture in the centre.

The second species, the long stricture, is so called because it occupies a considerable extent of the canal; here the submucous tissue is principally the seat of

fibrinous deposit, its cells become agglutinated, and a dense fibrous stricture is formed which not alone narrows the canal, but destroys its mobility and elasticity at that point. In some cases the corpus spongiosum is also implicated, its cells are effaced, and in process of time a complete change of tissue takes place ; these are the strictures that are so prone to relapse. Sometimes the long stricture is nodulated, the passage through it being irregular, and often quite granular. If they be much neglected, they are sure to become callous, the adventitious structure assuming a cartilaginous nature, which admits of its being felt like a piece of whip-cord through the perinaeum. The long stricture is for the most part met with in the anterior part of the canal, generally just in front of the bulb, and it may occupy from a quarter to one, two, three inches, or more, of its extent. In a very few cases the urethra has been found contracted uniformly from one end to the other, which remarkable effect we must assume to be caused by long continued urethritis, in which the lining membrane is highly vascular and in all probability granular, in a manner similar to the condition of the palpebral conjunctiva in chronic ophthalmia. The strumous form of urethritis alluded to in a former page is well calculated, if neglected or badly treated, to eventuate in this universal sort of stricture.

The third species—"the bridle" stricture—consists of one or more white firm bands which stretch across the floor of the urethra, being attached usually only at each extremity. This sort of stricture is rare, and its patho-

logy not clearly understood ; it would appear, however, that in some instances the cords or bands are formed from lymph effused on the surface of the lining membrane, and sometimes it would seem that they are slight "false-passages," being the result of the use of instruments. Occasionally these bands are numerous, but usually not more than two or three are to be met with. Their situation is generally the prostatic and membranous parts of the canal, and they can be often recognised during life by the instrument which is employed communicating a sensation such as would be caused by its having entered a number of cells. The foregoing are the three species of stricture met with in practice ; the many varieties mentioned in some books are in fact mere peculiarities, which any of the three species described may possess.

Sometimes the urethra is contracted by the formation of a cicatrix, and this constitutes perhaps the most ungovernable kind of stricture that can be encountered. The cicatrix may result from a rupture, wound, or ulcer of the lining membrane. A man falls from the roof of a house and comes astride on a rafter ; this ruptures the urethra, and blood escapes ; in the course of a few weeks, when the lacerated wound of the urethra has been healed, a firm unyielding obstruction remains. Strictures from ulcerations are generally met with at the orifice of the canal, and are the effect of bad chancres. In some of these cases the narrowing is not confined to the orifice ; the glans penis to a considerable extent becomes rigidly contracted. Extremely tight strictures, however, form

at the orifice, occasionally quite independently of ulceration; in some of these cases the canal is contracted to the size of a pinhole, the glans around being thickened and indurated.

Narrowing of the external meatus of the urethra sometimes occurs as a congenital malformation; it may extend from a quarter to three quarters of an inch in length, and this should be borne in mind. Sometimes, though very rarely, small tumors appear in the urethra in the form of red granular excrescences and polypoid growths; the former are usually found behind the meatus urinarius, within the fossa navicularis; the latter in the prostatic part, or at the neck of the bladder.

CHAPTER II.

Situation of organic stricture.—Causes.—Arguments in proof that gonorrhœa is a fertile remote cause of organic stricture.—Strumous and gouty urethritis as causes.—Congenital contraction.—Symptoms of stricture.—Rational and sensible evidence.—Constitutional symptoms.—Urinary fever.—Differential diagnosis of stricture.—Diminished and increased power of the bladder sources of deception.—Same states of the urethra have a similar effect.—Various mechanical obstructions to the bougie, not strictures.

STRICTURE may be situated in any part of the urethra from the orifice to the prostate gland, but its usual seat is in the vicinity of the bulb. There is some discrepancy of opinion as to the exact spot, some pathologists maintaining that it is more frequently met with behind the bulb, while others contend that it is anterior to this part. The weight of pathological testimony, however, goes to establish that the usual locality is immediately behind the bulb, at its point of junction with the membranous part of the canal. This spot corresponds with the place where the anterior layer of the deep perineal fascia comes into close relation to the urethra ; it measures about six and a-half or seven inches from the orifice, which is to be borne in mind, as this knowledge may often assist us in introducing bougies and catheters for the cure of stricture. The cause of this being the usual situation of

permanent stricture is due no doubt to the two-fold fact of its being, next to the fossa navicularis, the most common seat of gonorrhœal inflammation, and its corresponding with the voluntary muscles, the frequent contractions of which aggravate the effects of the inflammatory action within the canal.

We meet with strictures four and a half and three and a half inches from the orifice, and, as already mentioned, at the orifice itself; though this locality is rare. Strictures generally occur singly, but very often two or more are found in the same person. Hunter has recorded an instance in which there were six, Lallemand seven, and even as many as eleven have been reported.

The *causes* of permanent or organic stricture may be conveniently divided into the immediate and the remote. The immediate cause is chronic inflammatory action, by which the morbid changes already described are effected. The remote causes include every circumstance calculated directly or indirectly to produce chronic inflammation of the urethral canal, hence gonorrhœa, scrofulous and gouty urethritis, also wounds, ruptures and ulcers which leave cicatrices, all come under the head of remote causes. Of these the great fertile one is undoubtedly gonorrhœa. This fact was denied by John Hunter, and some eminent modern writers espouse his views on this point and uphold his arguments. It has been observed that gonorrhœa is a very frequent disease, and that if it were to be considered as a cause of stricture, the latter ought to be of more common occurrence. But this is taking quite an erroneous view of the point at issue. The question is

not, what proportion of cases of gonorrhœa get well without terminating in stricture ? but, when the latter occurs, what is its cause in the great majority of instances ? Gonorrhœa no doubt often disappears without leading to or laying the foundation of stricture, but how rarely is stricture not traceable to gonorrhœa. Pre-existent gonorrhœa at a distant period is not to be taken into account, but how frequently are we able to trace stricture by direct and well marked gradations to gonorrhœa, and to observe the course in the opposite direction from gonorrhœa to stricture. The thread of sequences is in general too closely woven to admit of any doubt as to the relation of cause and effect existing between the two diseases. How often do we find first acute gonorrhœa, this to degenerate into gleet, and, after the latter has existed some time, for stricture to be gradually developed ?

It is of great practical importance to establish the point at issue, for if gonorrhœa be not a common cause of stricture, then there is little need, comparatively, to cure the former quickly and effectually ; but if these two pathological conditions ordinarily hold the relation of cause and effect, the sooner and the more perfectly the gonorrhœal inflammation is removed, the less chance will there be of the formation of stricture. And does not experience teach that the chance of stricture following upon gonorrhœa bears a direct proportion to the length of time the latter disease has lasted in the form of gleet, the frequency of its occurrence, and the extent to which it has been neglected ? Gonorrhœa would, therefore, appear to be so marked a cause of stricture because of

its tendency to leave behind it chronic inflammation of the canal. But it has been argued that a very close relationship cannot exist between these two diseases, seeing that they differ so much in their ordinary seat. It has, however, been already observed that gonorrhœa frequently transgresses "its specific distance," and extends to the membranous part of the urethra, and it is under these circumstances that stricture is so apt to form. The tendency in gonorrhœa to spread, which has also been previously alluded to, is principally met with in persons of strumous habit ; in such gonorrhœa is peculiarly difficult to cure, so that the tuberculous diathesis may be justly viewed as a predisposing cause of stricture.

It may be here remarked that many practitioners who admit the connexion between gonorrhœa and stricture are inclined to ascribe the latter rather to the use of injections for the cure of the former ; but this belief is often entertained on slender grounds. Very often injections are had recourse to when stricture is forming or has formed, and as cessation of the urethral discharge usually follows their use, it is natural for the superficial observer to connect the disappearance of the one with the formation of the other. And no doubt if injections be employed at an improper period, and without due regard to certain particulars, those changes will result which lay the foundation of stricture. But if they be had recourse to at the right stage of gonorrhœa, and with caution and judgment, it is obvious that as they constitute the most effectual means of preventing the urethral inflammation from lapsing into the chronic form,

so they must be equally efficient in guarding against the formation of stricture.

Strumous inflammation, quite unconnected with gonorrhœa, sometimes leads to stricture. Those persons (and they are undoubtedly of strumous habit) who are affected with chronic thickening of the mucous membrane, of the nares, of the fauces, or of the external meatus of the ear, are also liable to chronic thickening of the lining membrane of the urethra, which if neglected or badly treated ends in process of time in stricture. The affection which I formerly described under the name of "strumous urethritis" is also associated with or terminates in stricture.

Gouty inflammation of the canal likewise induces stricture ; but there the permanent obstruction is the effect rather of thickening of the lining membrane from continual spasmodic contraction of the urethral muscles, than from any products yielded by the original inflammation. In a few instances congenital narrowing of the urethra is met with. From childhood, even from birth, an unusual irritability of the urinary organs is manifested. As the child advances in years this increases, and becomes accompanied by the evidences of obstruction in the urethral canal ; there is not only frequency, but forcing in making water ; and should gonorrhœa be contracted in after life, the symptoms are necessarily severe, and it is sure to cause the speedy development of genuine organic stricture.

The *symptoms* of stricture are local and constitutional : the former consist of rational and sensible evidence.

The rational is that which is adduced by the account furnished by the patient himself, as well as what we learn from observation, such as difficulty in expelling the urine, reduction in the size of the stream, &c. The sensible is afforded by our being able to feel an obstruction through the medium of a bougie or catheter. The first symptom of stricture is, in the generality of cases, increased frequency of micturition, the patient being obliged to get up at night once or twice to pass water. Cotemporaneously with this there is often slight urethral discharge, particularly when gleet has pre-existed. In many cases gleet will disappear, and return with the first evidence of stricture. In a short time an alteration in the shape of the stream of urine is perceptible; it becomes twisted, flattened, forked, or scattered, and by degrees its diameter is reduced. The patient soon experiences a marked difficulty in passing the urine, to overcome which he is called on to exercise an undue amount of expulsive force. As the case proceeds, the frequency of micturition increases, the patient being often obliged to evacuate the bladder three or four times in an hour; the difficulty in expelling the urine also augments, keeping pace with the gradual contraction of the urethral canal, until at length the stream of urine is reduced to the size of a thread, or merely escapes in drops. When the obstruction amounts to this height, the forcing and straining necessarily employed to expel the urine are excessive, being very often fully equal to what may be witnessed in the case of a woman in labour. The individual places himself instinctively in

various positions to assist the explosive power of the bladder ; at one time in a sitting posture, at another on his knees with the body bent forward, so that the vertex of his head almost rests on the ground ; the result of such violent straining, is the production of piles, prolapsus ani, hernia, and thickening of the coats of the bladder. Frequency and difficulty in expelling the urine, and diminution in the size of the stream constitute, then, the leading *rational* symptoms of stricture of the urethra. These, taken collectively, are quite sufficient to indicate the presence of some obstruction in the urethra ; and if to the information thus acquired there be added a clear history of the case, showing that gonorrhœa pre-existed, and that this degenerated into gleet which was neglected, we may entertain a strong conviction that stricture exists. The only conclusive proof, however, of the true nature of the impediment is afforded by the *sensible* sign which is revealed by the introduction of an instrument.

In cases of tight stricture of long standing, particularly where they have not been properly attended to, or badly treated, chronic cystitis gradually supervenes, and all the patient's distressing symptoms are augmented.

The first indication of chronic inflammation of the lining membrane of the bladder is furnished by the appearance of a slight cloud of mucus occupying the centre of the urine, after it is allowed to stand for a short time ; the quantity gradually increases, and it becomes thick and viscid, falling quickly to the bottom of the vessel, to which it adheres, often with so much tenacity that the act of turning the vessel completely upside down is incap-

pable of dislodging it. Eventually the secretion from the mucous membrane becomes semi-purulent. The urine undergoes remarkable changes as the result of the admixture of mucus. With regard to its reaction, it at first exhibits a neutral character, but by degrees it becomes strongly alkaline, crystals of the triple phosphate being discoverable by the aid of the microscope. The urine being alkaline acts as a powerful irritant to the inflamed mucous membrane, while the tough and viscid mucus greatly augments the difficulty of evacuating the bladder. Ere long the urine becomes ammoniacal, and often abominably foetid, and not unfrequently the triple phosphate and phosphate of lime may be seen thickly scattered through the mucus lying at the bottom of the vessel. In some cases, particularly those in which the stricture has been subjected to the rough and injudicious use of instruments, a subacute form of inflammation is occasionally excited in the bladder, which leads in general to very formidable results. The irritation travels from the bladder along the ureters to the kidneys, a scanty supply of very high coloured foetid and often bloody urine is secreted, a low form of fever is set up, the tongue becomes brown and parched, there is sometimes vomiting, the patient gradually falls into a semi-comatose state, and dies (often rather suddenly) at the end of three or four days, the result obviously of poisoning of the blood with urea.

When the urethral obstruction caused by the stricture has reached its height, and the canal is nearly occluded, retention of urine, first partial, afterwards com-

plete, occurs; and if either of these states, especially the latter, be not relieved by such decisive mechanical means as will entirely empty the bladder, the opposite condition, incontinence, supervenes, and the urine drains slowly away.

It is necessary here to observe that the dribbling of urine, so frequently associated with old tight stricture, arises from two distinct causes, and indicates two different pathological conditions. It may arise from dilatation of the urethra behind the stricture, a reservoir being thus formed which slowly and continually discharges itself, uncontrolled by any effort on the part of the individual. This state is comparatively of little importance, though it proves a source of extreme discomfort, from the constant wetting of the clothes. The other cause of the incontinence is due to over-distention of the bladder, which if allowed to exist long proves fatal. Notwithstanding the urine has been copiously draining away for some time and in such quantities as to wet the bed-clothes completely through, if the hand be placed on the hypogastrium, a large circumscribed tumor will be invariably felt in that situation. This is the bladder, which in many instances is so distended as to reach up to or even above the umbilicus. If this state of the bladder be not speedily relieved, the patient very soon dies from suppression of urine. The organ being distended to the full extent, cannot admit any further entrance of urine into it, which accordingly collects in the ureters, and eventually by exercising pressure upon the kidneys mechanically arrests the secretion of the urine. In cases

where the distention of the bladder has taken place more slowly, partial retention having existed for a long time, the fatal termination is considerably deferred, and most remarkable changes, to be described further on, are met with after death in the bladder, ureters, and kidneys.

The Constitutional Symptoms are in fact the effects the disease exercises on the system. In a great many instances stricture produces no appreciable impairment of health; an individual the subject of it may live for several years without experiencing any annoyance beyond the mechanical impediment to the escape of urine. Generally, however, the health suffers more or less; the prominent features being dyspepsia, associated with an irritable state of mind and body; but these constitutional effects are comparatively trifling. Not unfrequently stricture causes most serious derangement of the system, giving rise to a form of fever which, if neglected or badly managed, leads to very formidable results. This fever is of a distinctly intermittent character, and particular care must be taken not to confound it especially with common ague—a mistake which has been not unfrequently made by careless or unobservant practitioners, nor with the other forms of urinary fever, the remittent and continued.

The paroxysms of urinary intermittent, like those of all other fevers, consist of three stages, a cold, a hot, and a sweating. The cold, which is termed a rigor, is usually very severe; the hot is short; the sweating profuse and prolonged, being always followed by extreme debility. Sometimes a paroxysm consists merely of two stages, the

cold and the hot. Urinary intermittent in this country seldom comes on unless where the stricture has existed a considerable time, and may be in general considered as evidence of the advanced stages of the disease, and often of renal complication. In warm climates, however, the fever alluded to supervenes much earlier, being very frequently almost coeval with the formation of the stricture, and is much more severe. Its exciting cause is in general the introduction of an instrument, particularly if rudely or injudiciously employed. I shall have to allude to the occurrence of rigors from this latter cause in considering the treatment of stricture.

Remittent fever, which is also found associated with stricture, is still more formidable than the foregoing; since it depends more or less on serious derangement of the renal function. It is a true hectic fever, and presents itself in two distinct forms—the acute and the chronic. In the acute, the symptoms are urgent and severe; there are rigors followed by hot and sweating stages, the latter particularly being well marked. The perspiration is sometimes so profuse that the bed-clothes are soaked with wet, and when they are thrown down the steam rises from the body in a dense vapour, and conveys a strong urinous odour. The pulse is accelerated; there are nausea and dislike to food; often vomiting and hiccup. This urgent train of symptoms is caused, we must suppose, by the partial retention of urea in the blood, from imperfect eliminative action in the kidneys; still, where the case is properly managed and attended to, recovery will generally take place. Often, however, the

symptoms rapidly increase in urgency, the prostration becomes excessive, and the patient falls into a comatose state and dies. This fever generally supervenes in cases where there has been partial retention of urine in the bladder, from long continued inability to completely empty itself, owing to the closeness of the stricture, or is produced in cases of bad stricture in which a great degree of irritation has been excited in the bladder by the rough or too frequent employment of instruments. The chronic form of urinary hectic, though less formidable in appearance, is more certainly fatal, since it rarely if ever occurs unless where the kidneys are to a certain extent disorganized. The symptoms are the same in kind as, though far less intense than, the foregoing; but the patient gradually becomes emaciated and enfeebled, his intellect weakened, and after dragging on a miserable existence for many months, he slowly sinks and dies, sometimes utterly exhausted, sometimes from the non-elimination of the deleterious materials of the urine. The urine is in such cases purulent, and as very often there is incontinence as a result of the stricture and secondary affection of the bladder, the unhappy sufferer's condition becomes loathsome to himself and those who approach him, from the strong urinous odour exhaled from his clothes.

The continued form of urinary fever is met with principally as an accompaniment of retention of urine, and may present a sthenic or asthenic type. It appears then that urinary fever may be of the intermittent, remittent, or continued class. But occasionally the fever accom-

panying stricture presents an arthritic character, being to all appearance identical with gonorrhœal rheumatism, with which it may be readily confounded, when, as is often the case, there exists urethral discharge. Many of the joints swell and become painful in succession, and the case in general proves very obstinate and difficult of cure. This form of constitutional disturbance rarely occurs except where the stricture is subjected to treatment by the bougie, always following rigors thus produced, and is usually met with in persons whose health has been much broken down.

As regards the *Diagnosis of Stricture** it must be remembered that every case of difficult micturition is not necessarily one of stricture, though the cause may lie in the urethra. There may be force and increased frequency in expelling the urine, as well as diminution in the size of the stream, and still no stricture exist ; nay, more, in the absence of urethral lesion there need not be any mechanical impediment whatsoever, prostatic, calculous, or otherwise, to the evacuation of the bladder. Further, there may on the one hand be all the symptoms of obstruction to the escape of the urine, and on the other a decided impediment to the passage of some kinds of instruments along the urethra, without stricture, in the accurate sense of the term, being present. Peculiar states of the bladder and of the urethra, in which there exists no mechanical obstacle to the expulsion of

* The substance of the observations which follow on the diagnosis of stricture was published by me some time ago in the *Dublin Quarterly Journal of Medical Science*.

the urine, will assume all the characters of the latter disease. There are thus many sources of deception both to the individual himself and to the surgeon, which may lead to great mistakes ; hence it becomes all important to attend carefully to the differential diagnosis of stricture of the urethra. Want of proper contractile power in the bladder may cause the semblance of stricture. In this case the urine is feebly expelled, force more or less must be exercised by the abdominal muscles, and the stream is consequently diminished in size. Sometimes the urine escapes only in drops, or falls perpendicularly between the patient's legs. This condition, it is well known, is in many instances the prelude to paraplegia, being the first signal given of the paralysis which is about to supervene. Often, however, atony of the bladder is quite unconnected with the cause here mentioned, and seems to result from various circumstances. Sometimes it would appear to depend on a relaxed state of the entire system, and is then benefited by whatever tends to give general vigour, and occasionally it can be traced to the custom of retaining the urine for a long time. Boys frequently acquire the habit of holding their urine for several hours consecutively. This gradually destroys the natural sensibility of the bladder to its ordinary stimulus ; and when they grow up, and are placed under circumstances which render it inconvenient to obey the call to micturate as often as it may be experienced, they can readily resist it. Thus by degrees the organ loses its tone, and becomes unable to expel its contents except slowly, feebly, and in a narrow stream.

But exactly an opposite condition of the bladder, one of *increased* contractile power, is equally a source of deception, by leading to the manifestation of the symptoms belonging to stricture. The bladder acts frequently ; hence the quantity of urine in the organ being small, the stream from the urethra is small also, and as there is great urgency and force in expelling it, the case necessarily wears all the appearance of an obstruction in the canal. It is obvious, then, that two precisely opposite states of the bladder will cause the exhibition of the rational symptoms of stricture, and to such an extent that the only means of dissipating the illusion, and clearing up all doubt, is to resort to the introduction of an instrument.

Again, similar states of the urethra—diminished and increased contractile power—may produce such an effect on the stream of urine as to make the case simulate stricture. The urethra may be altogether in a relaxed and flabby condition, and the contractile tissue with which it is surrounded, be it muscular or not, and which undoubtedly assists in the final expulsion of the urine, may lose its tonicity, so that the canal can lend no more aid to the bladder in micturition than if it were a tube constructed of some inanimate material ; accordingly, the urine can only be expelled in a slow, feeble, and scattered stream. This state of the urethra often affects its entire length, in which case it is met with generally in persons of nervous temperament, particularly such as have suffered from aggravated dyspepsia, or who have enfeebled their health by long-continued habits of dissipation.

pation. Sometimes, however, and the cases are rare, this relaxed condition of the urethra is partial, occupying in general the portion which corresponds with the root of the scrotum, and then a remarkable effect is produced. The urethra having lost its natural elasticity and contractile tone at one spot, cannot here resist the force of the urine as it impinges against it ; accordingly it yields, and gradually becomes expanded into a sort of dilatation, which constantly retains more or less urine. When pressure is made with the fingers on the perineum, corresponding with the distended spot, a jet of urine is suddenly jerked out, and when the patient walks about, there is a continual stillicidium, which keeps his clothes wet, and deprives him of all enjoyment. The collection of urine in the urethra must of course impede the escape of that from the bladder ; force must, therefore, be exercised in order to expel it ; the stream from the same reason is reduced in size, and some pain is often experienced ; hence the case, so far as outward characters go, exhibits the strongest likeness to stricture. This remarkable and interesting pathological condition of the urethra would in general seem to have its origin in chronic inflammation of the lining membrane, to a limited extent, which gradually extends to the other tissues of the canal, destroying eventually its elastic and contractile properties ; and, indeed, if the urethra be furnished with a *true* muscular coat, it is easy to conceive, reasoning from analogy, how inflammation of its mucous coat will lead to paralysis of the former, and consequent dilatation, as in the case of other muscular tubes,—

the intestinal one for example. Many persons who have never had the least tendency to stricture, find that some time after passing water several drops of urine will escape when they sit down, or happen to make pressure in any way on the perineum. This arises from a deficiency of expulsive power in the urethra, and where the individual is in the habit of voiding his urine hurriedly, without waiting to expel the last drops completely, the relaxation of the canal gradually increases. If in this state the urine should become highly stimulating, as it is apt to do in gouty subjects from excess of lithic acid or lithate of ammonia, the drops retained in the urethra act as a constant source of irritation to the lining membrane ; and if, as is so likely to be the case, there be neglect of the proper treatment, and an over indulgence in the use of wine or ardent spirits, inflammation becomes established, and this gradually leads to the dilatation of the canal which has been described. This change is *essentially* of very slow formation, but a remarkable case, and one not easy to account for, in which it occurred with rapidity once fell under my notice.

A man, aged forty years, addicted to the occasional use in excess of ardent spirits, married, and having a family, was suddenly seized with painful erections at night, which were followed in many instances by seminal emission. This condition lasted for a fortnight, at the end of which time he perceived a slight puriform discharge from the urethra, accompanied by pain and difficulty in making water. The discharge disappeared in a few days, but the pain and difficulty in micturition

continued and gradually increased. After the lapse of about two months a new and remarkable feature attracted the patient's attention. He observed that for some time after each evacuation of the bladder, when he walked about, a considerable quantity of urine invariably dribbled away so as to keep his clothes wet, and that on pressing the perineum with his fingers, in one spot, a small stream was ejected. In this state he applied for surgical relief.

There was no discharge from the urethra, nor any evidence whatever of gonorrhœal inflammation, and he asserted in the most positive manner that he had not contracted that disease for many years. On examining the perineum, I found that at one spot, just at the root of the scrotum, and a little to the right of the mesial line, slight pressure caused the expulsion of a considerable jet of urine ; no decided bulging of the canal, however, could be detected, even when the patient made the effort to evacuate the bladder. Wishing to ascertain if there were any obstruction in the canal, I introduced an instrument, but a full-sized silver catheter passed with ease.

It is difficult to account for the phenomenon presented in this case, considering the comparative rapidity with which it was developed, and the peculiar symptoms which preceded it. There was obviously no stricture, so that the dilatation was not, primarily at least, mechanical. If there had been any laceration of the urethra during the violent erections which marked the commencement of the case, hemorrhage more or less should

have been observed : still, such was not the case ; and then it may be asked, what was the cause of the erections. It was evidently not gonorrhœa. Did the cause of this peculiar affection lie in any particular state of the urine ? At the time the patient applied to me this secretion was normal. Was the origin of the case ulceration of the lining membrane, leading to the formation of a sac which held a direct communication with the canal ? There was not any evidence of such a condition, which is so very rare where no mechanical obstruction exists in the canal ; there was no perceptible bulging of the urethra, no tenderness on pressure over the dilated spot, no puriform discharge, nor other sign of a urinary sac formed by ulceration of the lining membrane. It is clear that the dilatation of the urethra resulted from partial atony of its elastic and contractile tissues ; but what was the cause of so comparatively sudden a change in this case cannot be satisfactorily explained.

Now, as in the case of the bladder, so in the urethra ; a state of increased contractility, a condition exactly the converse of the last, will give rise to all the appearance of genuine stricture. This leads materially to the consideration of the muscularity of the urethra, which has been already dwelt on. But whether we view the doctrine that the urethra is muscular as a reality or not, is immaterial in a practical light, since it cannot be denied that the canal possesses a marked contractile property, which is the cause of many remarkable phenomena it presents under certain conditions. It is this contractility of the urethra, exalted to a high pitch by a peculiar state

of the nervous system, as well as by the influence of weather and climate, which, most of any condition yet mentioned, assumes the characters of true stricture, and is accordingly a source of great deception. Persons of a highly nervous, irritable habit, whose digestive functions have been impaired for many years, are apt uniformly to void their urine in a narrow stream, though no trace of stricture be present, nor any of the ordinary causes of the disease have ever been in operation ; and on occasions where these individuals are subjected to excessive mental anxiety, there is often so much difficulty of micturition as to amount to retention of urine.

When matters go so far as this, spasm of the voluntary muscles always co-exists ; but in the slighter, which are the ordinary cases, the contraction of the canal is altogether independent of the action of the compressores urethræ muscles, and is referrible entirely to that tissue which, as already observed, is according to microscopic demonstration composed of minute involuntary muscular fibres. Most frequently the contraction of this tissue is uniform, but sometimes it would appear to be partial, by which a sort of slight annular constriction is formed, capable even of offering a feeble resistance to a bougie of moderate size, and this may be situated in any part of the canal, from the orifice to the prostate gland. It is easy to conceive how such a state may be confounded with incipient organic stricture. In either case the stream of urine is necessarily reduced in size, and some force is required to expel it. We see, therefore, that two exactly opposite states of the bladder and of the urethra—one of

augmented and the other of diminished tonic power—will lead to the manifestation of the rational symptoms of stricture. In all such cases we can arrive at a negative diagnosis by introducing an instrument, when, if it pass without meeting any decided obstacle, we must conclude that stricture is absent. But, as has been intimated at the commencement of these observations, a decided obstruction to the passage of an instrument may be experienced in the urethra, and still no stricture, properly so called, exist ; this is, indeed, a source of strong deception, for here we have the *sensible* sign of stricture, and when, as frequently occurs, the rational symptoms co-exist, the similitude of the case to the *real* disease is complete. Such cases demand the utmost circumspection, without which serious mischief may be done to the urethra by the use of instruments ; and where great care be not taken, even the most experienced surgeon may be altogether misled. Undoubtedly the most common impediment to the introduction of an instrument, apart from stricture, is enlargement of the lacunæ of the urethra ; in this way pouches are formed, into which the point of an instrument of small size, particularly a straight one, readily enters, and its onward course is intercepted. This condition is most usually met with where stricture is present, but it is occasionally found as the result of long-continued irritation of the mucous membrane, where not the slightest reduction in the caliber of the urethra exists. The lacunæ, as is well known to anatomists, lie on both aspects of the urethra, but particularly on the lower ; the lacuna magna, however, occupies the upper, about an

inch or an inch and a half from the external orifice, and this is the pouch into which the point of a small instrument is so apt to slip.

Another impediment to the passage of an instrument along the urethra is an exaggerated condition of the natural rugæ of the mucous membrane; these frequently become enlarged and thickened in such a manner, that the point of a moderate sized instrument cannot fail to hitch against them, though they may be unable to produce any sensible obstruction to the escape of the urine. Sometimes, however, the contractile fibres of the urethra are at the same time thrown into undue action; the rugæ, therefore, become closely approximated, and the folds are rendered more prominent; accordingly, the caliber of the canal is somewhat diminished, and the stream consequently reduced in proportion; the obstruction to the instrument is also increased, so that the case bears the strongest resemblance to stricture; and the deception is the greater, since it is in the most common localities of the latter disease,—the bulb and membranous parts,—that the rugæ chiefly abound.

But it is towards the neck of the bladder that obstacles are apt to be encountered, which are really mere exaggerations of the natural state of the parts, or only trifling deviations from it. In the prostatic portion of the urethra a complete stoppage may be given to an instrument, though there be no contraction whatever, nor any enlargement of the glands. The prostatic and ejaculatory ducts are sometimes considerably dilated, the sinuses on each side of the verumontanum become

deepened very often, and in other cases the septa intervening between the dilated mouths of the prostatic ducts form bands which cross each other in various directions, constituting a complete net-work; in all these conditions it is evident how the point of an instrument may hitch or become entangled. Again, the "uvula vesicæ" sometimes becomes enlarged and elevated, and projects into the internal meatus of the urethra in such a way as to offer direct opposition to the introduction of an instrument into the bladder. Very frequently a band of mucous membrane (altogether distinct from what has been termed the "bar" at the neck of the bladder) becomes stretched transversely across the inner opening of the canal, which both obstructs the entrance of an instrument into the bladder, and interferes with the escape of the urine from it; this condition is often met with in persons who have never had gonorrhœa, and usually in those who possess a relaxed and flabby state of the entire canal, such as has been already described.

The foregoing are most of the deceptive impediments experienced in exploring the urethra; and it is quite obvious how easily the surgeon may be drawn into a mistake which may prove, if not absolutely productive of serious consequences, at least of much perplexity and annoyance, not only to himself but to the patient. In all the states of the urethra detailed the diagnosis rests on—whether it be possible to pass a full-sized instrument or not; in the case of enlarged lacunæ, of thickened rugæ, of prominent "uvula vesicæ," of the transverse fold at the internal orifice of the canal, and of the net work

which has been described as being occasionally situated in the prostatic part, a large instrument will pass readily, while a small one necessarily hitches, or gets entangled; hence it becomes of great importance always to use a full sized instrument in exploring the urethra, with a view to the discovery of stricture. When the impediment lies anterior to the bulb, a straight instrument will pass with the greater ease: but when it lies far back in the urethra, or at the neck of the bladder, a curved one must be employed.

It too frequently occurs, when a patient applies to a surgeon, complaining of difficulty in micturating, for the latter to prejudge the case immediately, and to set it down as stricture: this leads him to explore the urethra with a small instrument, in consequence of which he is very apt to encounter some of the deceptive obstacles already enumerated; he, therefore, becomes confirmed in his previous belief, and instead of resorting to a large instrument, which would, in all probability, readily pass, and thus reveal the true nature of the case, he descends in the scale of sizes, whereby not only is his chance of succeeding diminished, but the lining membrane of the canal seldom escapes laceration. We see, then, how numerous are the sources of deception connected with the diagnosis of stricture of the urethra. In some instances the rational symptoms of the disease are exhibited *per se*; in others, the sensible sign; while, in many, both are combined; there may be difficulty, pain, and frequency in passing water, and the existence of an obstacle to the introduction of an instrument, without stricture in the correct sense, being present.

CHAPTER III.

COMPLICATIONS AND PATHOLOGICAL RESULTS OF STRICTURE.—

Spasm, two kinds.— Irritability, local and general.— “ Irritable Urethra,” its connexion with gout.— Spermatorrhœa.— Pain and tumefaction of the prostate gland ; chronic enlargement of the organ.— Calculus.— Swelling and tenderness of the testis and epididymis.— Hydrocele.— Morbid changes in the urethra, bladder, ureters, and kidneys.

THE most common complication attendant on organic stricture is spasm ; indeed, there are few cases with which more or less spasm is not occasionally associated, and there is no occurrence more annoying to the patient and perplexing to the surgeon than this, since it affects so much, on the one hand, the capability of passing urine ; on the other, that of introducing an instrument. The spasm in these cases is undoubtedly of two kinds : one resulting from the action of that tissue composed of the so-called involuntary muscular fibres ; the other from the contraction of the voluntary or Wilson’s muscles. The latter is the principal and most important kind of spasm which complicates stricture, for it is impossible that muscular fibres, so minute as to require for their demonstration a magnifying medium of the highest power, can contract so as to produce a forcible closure of the canal ; hence Sir Benjamin Brodie’s statement, that spasm can alone occur at the membranous part of the urethra,

though not exactly correct according to recent discovery, is in a practical sense, perhaps, perfectly true. In almost all cases of organic stricture, spasm is apt to be excited by exposure to cold, wet, or much fatigue, or by too free an indulgence in the pleasures of the table, particularly in the use of wine or spirits, and very frequently it is caused by rudeness in the introduction of instruments. In some instances, however, the proneness to spasm is so strong that the most trivial causes will induce it, and sometimes it would appear to occur without any assignable cause, or to be produced entirely by mental influence. The latter is so powerful a cause of spasm of the compressores urethræ muscles, that there are some well authenticated cases on record in which retention of urine has occurred from it alone, there being no organic stricture, nor any appreciable lesion of the canal. But the extreme disposition to spasm which marks some cases of stricture would appear to arise from one of two causes,—irritability of the system generally, and irritability of the urethra itself. The first condition occurs in persons of a highly nervous temperament, and particularly in those who have led a luxurious or dissipated life, and very frequently it is connected with and seems to depend on dyspepsia and derangement of the hepatic function. The second condition—local irritability—is the great source of spasm affecting organic stricture. It consists in a high degree of sensibility—“*morbid sensibility*”—which is a state *minus* inflammation, and this involves not only the stricture itself, but the urethra in its vicinity, to a varying extent; sometimes it appears to occupy the entire

canal, and even to extend to the neck of the bladder, leading to very distressing symptoms, which may simulate those of vesical calculus. This is what many writers have denominated "irritable urethra." In such cases there are always some scalding and frequency in passing water, and in general slight puriform discharge, together with a remarkable fluctuation in the ease with which micturition is accomplished, all which symptoms are greatly aggravated by taking stimulants, by sexual indulgence and over-exercise. When the stricture is incipient or but slight, an instrument of considerable size will pass, and more readily always than a small one; but as it glides over the diseased spot, particularly if that be situated in the membranous part of the canal, smart pain is experienced. This irritable state of the urethra appears, in many instances, to be connected with irritability of the system at large, such as has been already alluded to; very often, however, it is *purely* local, and may be the result of a stricture being neglected or mismanaged, or it may be the effect of one or more attacks of gonorrhœa during the formation of a stricture. In not a few instances the disease obviously depends on gout; and even where it acknowledges another and more efficient cause, the coexistence of a gouty diathesis will not fail to aggravate the symptoms.

When the urine is rendered highly stimulating from excess of lithic acid and the lithates—a circumstance so apt to occur in gouty subjects—all the urinary annoyance is increased fourfold; the scalding and frequency in micturition are augmented, and the spasmodic action

of the muscular fibres may become so strong as to close the canal completely. Occasionally, though no doubt very rarely, where there is much spasm, and consequently more than usual slowness and difficulty in emptying the bladder, the urine becomes filtered, as it were, and deposits a slight calcareous crust of lithate of ammonia within or behind the stricture. When such an event occurs, the urinary distress assumes often a very urgent character.

A gentleman was recently under my care for stricture, coupled with irritable urethra ; he possessed a well marked gouty disposition, and suffered to a great extent from dyspeptic symptoms. Whenever he attempted to depart in the slightest degree from his ordinary food or drink, his urine became loaded with lithic acid or its salts, and this never failed to add to the local annoyance from which he suffered. After he had been under treatment for the stricture for a short time, and had been considerably relieved, he began to complain, without any apparent cause, of a return of his former symptoms, which gradually increased, and amounted to such a height, that it was with great difficulty and extreme pain he could empty the bladder. I immediately suspended the use of the instrument, but anodynes, and the ordinary treatment for inflammation of the urethra, were unproductive of the slightest benefit. At length, in a paroxysm, he expelled from the urethra a small cake of lithate of ammonia, to the complete relief of all his pain and distress.

The two kinds of spasm which have been described constantly occur separately, but they are often combined,

the entire canal being in a state of undue contraction ; in such cases the difficulty of micturition is considerable, and the surgeon feels, almost immediately upon introducing a bougie, long before it can arrive at the stricture or membranous part of the urethra, a certain degree of resistance or slight grasping of the instrument. This state varies remarkably : one day the individual is able to void his urine in a tolerably full stream, and a bougie will pass with facility ; the next day, owing, perhaps to exposure to wet, or to coldness of weather, or to some derangement of health, the urethra becomes universally contracted, and the instrument in ordinary use is grasped before it has traversed hardly one inch of the canal.

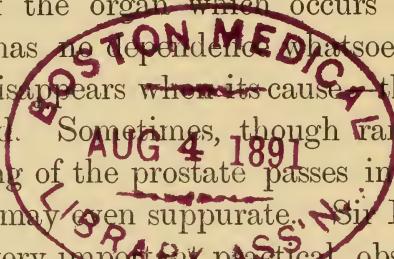
Another complication with stricture is spermatorrhœa, and this proves a source not only of mental anxiety to the patient, but leads often to physical debility. Frequent nocturnal emissions may constitute a symptom of stricture under any circumstances, but most usually are associated with the irritable state of the urethra just described ; the "morbid sensibility" often extending into the prostatic part of the canal, and thus proving a direct cause of irritation to the seminal ducts. It must be remembered, however, that the coexistence of spermatorrhœa with stricture does not necessarily imply the relation between them of cause and effect ; the former may have been antecedent to the formation of the latter, being the result of various circumstances. In such cases the cure of the stricture is of course not followed by the cessation of the seminal emissions ; but where the spermatorrhœa has occurred subsequently to the first symptoms of stric-

ture, and seems to depend on it, or on "morbid sensibility" of the canal in connexion with it, obviously nothing short of the complete removal of these states can lead to a cure of the spermatorrhœa.

A third complication with organic stricture, and one which is particularly worthy of note, is pain and swelling of the prostate gland. Care must be taken not to confound this sympathetic affection with that chronic enlargement of the organ which occurs in advanced life, and which has no dependence whatsoever on stricture ; the former disappears when its cause—the stricture—has been removed. Sometimes, though rarely, the sympathetic swelling of the prostate passes into acute inflammation, and may even suppurate. Sir Benjamin Brodie makes two very important practical observations on the sympathetic affection under consideration. He says :—

" 1st. Where a simple chronic enlargement of the prostate gland supervenes on stricture of the urethra, the latter usually becomes less liable to spasm, and is more easily dilated, and altogether more tractable than it was before : a change in its condition which is easily explained, as the pressure of the urine against the stricture when the patient strains in making water is a constant source of irritation, which is, in great measure, removed as soon as a new impediment to the flow of the urine between the stricture and the bladder is established, by the tumour of the prostate.

" 2nd. But where the disease of the prostate goes beyond a mere enlargement, and suppuration has taken place in its substance, an opposite effect is produced on the stricture ; the abscess itself becoming a source of irri-



tation, rendering the stricture more sensitive, and more liable to spasm than it would have been otherwise."

But in advanced life it is common to find stricture associated with hypertrophy or chronic enlargement of the prostate gland ; the combination may be a mere coincidence, as prostatic enlargement is so frequent a visitant after a certain age ; but there is little doubt that the irritation caused by the stricture accelerates the approach of the other disease. This complication of stricture is most troublesome, the prostatic affection aggravating all the symptoms belonging to the former, and adding new sources of distress. The frequency of micturition is greatly augmented, and the difficulty of expelling the urine increased, not only in consequence of the impediment formed at the neck of the bladder by the enlarged gland, but of the large quantity of thickropy mucus, which, after the prostatic disease has lasted for some time, is sure to be secreted from the bladder. The cure of the stricture is also more or less retarded by the same cause, owing to the difficulty of introducing into the bladder such instruments as will readily pass through the stricture, those of small size being ill adapted for surmounting an eminence at the neck of the bladder. Still the stricture can be effectually cured, as it is not necessary to pass the instrument into the bladder, though it is satisfactory to do so.

Another complication, one which like the last may be a coincidence, but is most usually induced by the stricture, owing to the unhealthy condition of the urine so frequently co-existing, is the formation of calculus either in the urethra or in the bladder.

Urethral calculi (if we except those produced in the prostatic ducts) are rare in conjunction with stricture, unless where, as will be hereafter explained, perineal fistula exists. Thin layers of calcareous matter, composed of phosphate of lime, the triple phosphate, or even the lithate of ammonia, are occasionally met with behind stricture, giving rise to great aggravation of the patient's sufferings; but perfectly formed calculi are rarely found in that situation. The concretion can form much more readily in the bladder than in the urethra, and as it can grow with facility in the former situation, especially if the urine be alkaline, it soon attains too large a size to enter the internal orifice of the urethra. Hence vesical calculus is the more common accompaniment of stricture.

The calculus may have its origin in the bladder, in which case it is purely phosphatic, being composed of the triple phosphate of ammonia and magnesia and the phosphate of lime; or a small uric acid or oxalate of lime calculus may descend from the kidneys, and serve as a nucleus for phosphatic deposit.

Now, stone in the bladder, conjoined with stricture of the urethra, constitutes a most painful, troublesome, and serious case. Its real nature may readily escape recognition, because the two diseases reciprocally mask or modify the manifestation of their individual symptoms. The patient himself naturally ascribes the increase of pain and frequency of passing water—the result of the presence of the calculus—to an aggravation of the symptoms belonging to the stricture; and the surgeon is

unable to arrive at a proper conclusion, since a satisfactory method of sounding cannot be adopted. Still, if a clear history of the case and such an account of the symptoms be furnished as will afford good rational evidence regarding the calculus, there can in general be little doubt entertained as to the kind of complication that exists.

In a case of this sort the cure of the stricture is of course an essential preliminary to the removal of the calculus ; when this has been accomplished, lithotrity, lithotomy, or one of the several operations of urethrotomy must be performed. Lithotrity is the method the surgeon would naturally select, but it is inadmissible except in those cases which admit of the complete removal of the stricture, and the dilatation of the urethra to such an extent as to allow the introduction of full sized lithotrites, and the ready expulsion of detritus. Very often strictures can be only partially removed, or at least the urethral canal cannot be dilated to the extent which satisfactorily fulfils the purposes of lithotrity ; still if the calculus, as is most frequently the case, be altogether or chiefly phosphatic, and that a moderate sized lithotrite can be introduced, it may be so fully pulverized as to be expelled without much difficulty along the urethra. When the stone is hard, so as not to allow of its being reduced to such small fragments as can be expelled without difficulty, the *scoop lithotrite* is admirably adapted to the case ; where the calculus is small, two or three applications of it sufficing to completely rid the bladder of its occupant : the urethra must be, however,

dilated to a certain extent for this purpose, as the instrument alluded to is of considerable size. When the calculus is entirely or chiefly phosphatic, if there be much secretion of mucus from the bladder and alkalinity of the urine, considerable good is often produced by injections of hydrochloric acid, and cases may even occur in which it is possible to effect thereby some palpable reduction in the size of the stone.

It follows then that when the urethra does not admit of being fully dilated, and the calculus is large and hard, some other method than lithotritry must be resorted to. As soon as a proper sized staff can be introduced, lithotomy may be performed ; or, what is in general more appropriate and freer from danger, lithectomy.

The obvious advantage of the latter and of all operations that involve division of the urethra alone, is that the neck of the bladder is left uncut, the passage for the extraction of the calculus being made by gentle dilatation, effected through the medium of the finger or Arnott's dilator. But a great advantage offered by lithotritry in these cases is that the division of the stricture with the knife may, if necessary, be accomplished at the same time ; by which means the individual is saved protracted pain and trouble. De Borsa's operation answers remarkably well, but the modification of that method by Allarton is to be preferred, it being a more perfect and safer mode of opening the urethra and gaining access to the bladder. The following is the description given by Allarton of his operation :—

" I introduce a grooved staff in the usual manner, and

of the usual size, and confide it to an assistant, with directions to keep it perpendicular and hooked up against the pubes ; I then introduce the index finger of my left hand into the rectum, placing its extremity in contact with the staff, as it occupies the prostate, and press it firmly against the staff, so as to steady it, then, with a sharp-pointed straight knife, with tolerably long and rough handle, I pierce the perineum in the middle line, about half an inch above the anus, or at such distance as may appear necessary to avoid dividing the fibres of the external sphincter,—I carry the knife steadily and firmly on till it strikes the groove of the staff, the deep sphincter lying between the knife and the directing finger, which enables me to judge of the distance as the knife passes along. If the incision be not made exactly in the median line, the contracting fibres of the injured muscles draw the point of the knife from its direct line and interfere with the accuracy of striking the staff; hence the advantage of the long rough handled knife, which affords a firmer hold and better purchase. Having struck the groove of the staff, I move the point of the knife along the groove towards the bladder a few lines, and then withdraw it, cutting upwards, (as shewn in plate 1,) so as to leave an external incision of from three quarters of an inch to one and a half inches, according to the presumed size of the stone : the escape of urine indicates the entrance to the urethra. I then introduce a long ball-pointed probe or wire through the external opening into the groove of the staff, and slide it into the bladder to sufficient depth to insure its safe lodgment in that viscus,

and withdraw the staff. I then well grease the index finger of the left hand and pass it along the probe, with a semi-rotary motion, through the prostate into the bladder ; which procedure is achieved without difficulty, and when the stone is free it comes at once into contact with the finger, and, if of moderate size, passes at once into the wound on withdrawing the finger, the patient having power to strain upon and thereby facilitate the extraction of the stone ; this last-mentioned power being one of the great advantages of this operation. The incision being made strictly in the median line, no muscles are divided and the integrity of the bladder being preserved, it is under the control of the patient, who exerts, at the wish of the surgeon, a powerful propulsive effort which keeps the stone in or in contact with the internal extremity of the wound, where it is easily seized by the forceps and extracted by mild persevering traction. Now, as the aperture is necessarily the size of the finger which produces it, if the stone be large some other dilating power must be employed in addition to the dilating effect of the forceps and stone combined ; for this purpose Weiss' three-bladed female dilator, Arnott's hydraulic dilator, or, what is at once ready and effective, the addition of the vulcanised india rubber finger stalls one over another until the finger is sufficiently enlarged for the purpose, the outer covering being well lubricated with lard before being introduced. But Arnott's dilator, where it can be procured, is by far the most efficacious though not the most expeditious means. Should the stone be of unusual size, it may be readily broken by a

short, strong and straight lithotrite, or by a strong and suitable pair of forceps closed by a screw, if the stone be soft and yielding—I say readily, because the stone is, in this operation, within so short a distance of the external aperture that mechanical aid can be brought to bear upon it without the slightest difficulty or risk ; again, should the stone resist the efforts to crush or extract it, the wound can be readily enlarged upwards or downwards, by dividing the deep fascia, or even be converted into a bilateral aperture sufficient to extract any average sized stone. I believe the deep fascia to be the great obstacle to the extraction of the stone ; I have observed that it acts like a ligature round the finger or forceps, and resists the extraction of the stone. The patient suffers little in this operation, and merely complains of the pricking-stabbing sensation of the first thrust of the knife ; the subsequent extraction of the stone does not appear to cause pain ; he passes his urine freely by the urethra as well as by the wound, from the time of the operation, and there can be little doubt that the wound might be nearly healed by the first intention with perfect safety. Two of my patients were up and out the day after the operation, and one was walking out on the third day (a cold, snowy, frosty day.) The wound, left entirely to nature, without tents, &c., heals in about three weeks. The patient, from the completion of the operation, excites no anxiety for his safety ; he usually sits up and moves about on the following day, and I cannot well imagine the advent of inflammatory or other bad symptoms."

The last complication of stricture to which I shall direct attention, is swelling and tenderness of either testis, or of the epididymis. This is, perhaps, more correctly to be viewed as an effect of stricture. It is frequently attributable solely to the introduction of instruments, but is occasionally met with where the stricture has never been subjected to treatment. Sometimes effusion takes place into the tunica vaginalis. The hydrocele thus formed often disappears, when the urethral irritation which produced it is removed by the cure of the stricture; but when the effusion is *passive*, and the patient is beyond the middle age, the fluid is rarely absorbed and it becomes necessary to treat the case without regard to its origin. When the swelling caused by the hydrocele is very bulky, it often interferes with the introduction of instruments, under which circumstance the case is simplified by drawing off the fluid in the tunica vaginalis with a small trocar and canula.

One of the most serious of the *pathological results of stricture* is dilatation of the urethra behind the obstruction. This is altogether a mechanical effect, and bears a direct proportion to the degree of impediment offered to the escape of the urine. The bladder propels the urine against the stricture, which not permitting its free escape, it accumulates, and thus mechanically distends the canal immediately behind. This dilatation can sometimes be both seen and felt when the patient forces to pass water, and it may, as will appear hereafter, be taken advantage of under particular circumstances. In rare instances the dilatation has been met with a short

distance from the orifice of the urethra : in the museum of the Richmond Hospital is contained a preparation which exhibits a remarkable instance of this kind. The stricture extends from the external orifice for about an inch along the canal ; behind it the urethra is dilated into a sac large enough to hold a walnut, and on its floor there exists an opening of sufficient width to admit the tips of three fingers, which leads into a pouch fully equal in size to that of a small orange, constituting a sort of secondary bladder.

Dilatation behind the stricture *per se* is, however, comparatively of little importance, but in process of time the dilated part becomes generally the seat of different morbid actions which often lead to very serious results ; it becomes inflamed and coated over with lymph ; calcareous formations are deposited there ; and ulceration is frequently established, which is the worst effect of all, as it is so apt to cause abscess in perineo or infiltration of urine.

The next effect of stricture to be noticed is that which is manifested on the bladder ; the organ sometimes exhibiting very extensive and remarkable pathological changes. It has been already observed that one of the earliest symptoms of stricture is irritability of the bladder, the result of sympathetic disturbance, and there is none of its effects more distressing than this. In some cases the individual will be disturbed several times at night to pass water, until eventually from loss of rest his health becomes seriously impaired ; in the day-time the frequency and urgency are even greater,

so that he is often debarred from following his business, mixing in society, or engaging in amusements as heretofore. This effect of stricture often bears no proportion to the degree of the disease or its duration. In some instances irritability of the bladder comes on at the earliest stage of the stricture, and before the obstruction is sufficient to cause any marked reduction in the size of the stream of urine. Under such circumstances the individuals are usually of that peculiar irritable habit to which allusion has been already made, and very frequently by placing them in a condition favourable to their general health, the irritability of the bladder becomes considerably lessened though the stricture has remained untreated. The consequence of this irritable state of the bladder is to cause at first simply a diminution in the capacity of the viscus, but as the impediment to the escape of the urine increases, and the organ has to exercise proportionate force, its muscular coat becomes greatly developed ; and this occurs in obedience to a fixed physiological law, that muscular fibres augment in thickness and strength in a direct ratio to the force and frequency with which they are called on to act. The hypertrophy of the bladder is therefore at first *concentric*. As, however, the difficulty to the escape of the urine increases so that the organ can never completely evacuate itself, its capacity is gradually enlarged and the development of the muscular fibres still continuing, the hypertrophy of the bladder is then *eccentric*, and may be compared in the mode of its occurrence to the hypertrophy with dilatation

of the left ventricle of the heart accompanying the advanced stage of contraction of the aortic opening. Owing to the fasciculated arrangement which the muscular fibres of the bladder are apt to assume, being collected into columnæ in a manner resembling the musculi pectinati of the right auricle of the heart, interspaces are left, and through these the mucous and submucous coats of the bladder are often protruded, forming pouches or herniæ : the contraction of the muscular fibres from without and the counter-resistance of the urine within, caused by the obstruction offered to its escape along the urethra, have the effect of forcing out the mucous membrane wherever a separation in the fibres exists. The pouches formed in this manner vary extremely as to size and also as to number ; there may be one, but often two, three, or more are met with, constituting the “sacculated bladder.” When only a single pouch exists this sometimes acquires a great magnitude, forming a secondary reservoir which exceeds the dimensions of the bladder proper ; it is often very thin, being composed of the mucous coat of the bladder, with areolar tissue and a few muscular fibres scattered over it.

From the absence of a perfect muscular coat to this sac, it is unable to expel its contents effectually, while its position very often is such as to favour the entrance of urine into it from the bladder when the latter contracts ; thus, it is kept in a state of almost continual distention. A common situation which this large sac occupies is the space between the bladder and rectum, and here it may become the object of great surgical importance, since the

surgeon can often by plunging a trocar and canula into it adopt the simplest, readiest, and perhaps safest method of relieving a case of retention of urine.

A sacculated condition of the bladder is not revealed by any marked symptom, but we may often infer the existence of a large cyst from the circumstance that after the individual has passed urine in the ordinary way, a considerable quantity more escapes on his placing himself in some peculiar position. A common posture assumed where the sac lies between the bladder and rectum is a kneeling one, the body being bent forward, the forehead nearly touching the ground ; thus a sort of inclined plane is formed, which effectually favours the exit of the fluid contained in the pouch. We may also suspect the connexion of a sac with the bladder, when, after introducing a catheter, and drawing off, to all appearance, the whole of the urine, a fresh flow occurs upon altering the direction of the instrument.

The following case, which was laid before the Dublin Pathological Society by Mr. Fleming of this city, illustrates in a remarkable manner the great size which these sacs may attain, and how apt they are to produce fatal results. I copy from the report of the Pathological Society's proceedings, as given in the *Dublin Hospital Gazette* :—

“ Here the pouch was enormous, and was capable of containing more than half a pint of fluid, and far exceeded the size of the bladder. It was situated at the back of the bladder, towards its fundus, and communi-

cated with it by a narrow circular opening capable of admitting a catheter about No. 12 or 14.

"The subject of the case was a policeman aged about thirty-six years. He was a pallid looking man, but in other respects appeared to enjoy ordinary good health, and to be equal to the performance of his usual duties. For two years he laboured under symptoms of urinary irritation, which were supposed to be produced by stricture, and which were treated as such; yet, on examining the urethra, a No. 10 catheter passed with ease into the bladder. His prominent complaints were frequent, urgent, and painful desire to pass water, and various neuralgic sufferings in and about the region of the bladder. He did not note any uneasiness in the lumbar region. The quantity of urine he passed was natural, but it was always heavily loaded with a deposit of a thickish and tenacious character. Whilst under treatment in the hospital, about the month of June last, he was so relieved from his principal sufferings that he resumed his duties, and remained well for the months of July, August, and September, still suffering, however, from more or less vesical irritation. Towards the latter end of September all his symptoms returned with intense severity, and in October he was readmitted into hospital, labouring under symptoms of peritonitis. During his stay in hospital he principally suffered from attacks of retention of urine; and the peculiarity of such attacks was, that a very small amount of urine was carried off by the catheter, but even from such the relief

was so great, that the demands for the repetition of the operation were constant, the sensation of fulness from accumulation of urine in the bladder being almost persistent. There was some tumour discernible above the pubis, but its outline was unsatisfactory. The prostate gland was not enlarged, and no fulness was to be felt in the rectum. The man died of chronic peritonitis in the latter end of October ; and the condition of the urinary organs was particularly investigated. The ordinary appearance of peritonitis was visible, and towards the pelvis was more intense. Here, in the ‘cul de sac’ behind the bladder, there was superadded a copious effusion of foetid urine, mixed with shreddy materials, which, on more close examination, were found to be the debris of a gangrenous patch on what appeared at first to be a distended bladder which had given way. Here a large pouch, as if growing out from it, occupied the whole cavity of the pelvis, displaced laterally the rectum, and tilted upwards and rather forwards the bladder, which was small and contracted. At the lower and back part of this pouch, a sloughy opening presented itself. The removal of the urinary organs admitted of more close examination of them. The kidneys were healthy, the left ureter somewhat dilated near its connexion with the bladder, and the latter contracted, thick-coated, and irregular on the mucous surface, as usually presented in its chronic affections. At its back part towards the fundus was a circular opening perfectly smooth, and lined with mucous membrane. This led into a large adventitious pouch, similarly lined, but

wholly devoid of any trabecular arrangement, as in the bladder. Foetid urine, mixed with pus, mucus, and sloughy shreds, lay partially confined in it, and intermixed were found some small irregular lithic acid calculi. In the neighbourhood of the sloughy patch alluded to, the lining of this cavity presented somewhat an ulcerated surface."

But the morbid changes the bladder undergoes, as the result of stricture of the urethra, are not confined to the muscular coat ; post mortem examinations generally reveal alterations in the mucous membrane, which are principally produced by inflammatory action of varying intensity. The membrane is congested and thickened, and presents all degrees of vascularity, from a slight stellate or punctiform arrangement to a condition in which the vessels become very much enlarged and tortuous. When the inflammation has been acute, the vascularity is so intense as to give to the membrane a rich vermillion coloring, and we discover patches of lymph adhering to it in various places, and by no means unfrequently traces of superficial ulceration. Sometimes we meet with marks of extravasated blood either in the substance of the membrane, beneath it, or on its surface, or in all these situations, and the blood so extravasated may present the appearance of minute petechiæ, or occur in patches of considerable extent; ecchymosis occupying nearly the whole interior of the bladder may be seen in cases where there had existed a very tight stricture for many years. In cases of long standing, where the urine has been highly alkaline, it is not uncommon to

to find layers of calcareous matter deposited on the lining membrane in different parts, or collected in the form of calculi in the sacs or pouches already described. These formations are almost invariably constituted of the phosphates. If the evil consequences of stricture were to terminate in its effects on the bladder, life might be prolonged almost indefinitely ; but they extend in process of time to the extreme end of the urinary apparatus, and, by leading to destruction of the secreting part of the kidneys, insure a slow but certain death. When the gradually increasing collection of urine which takes place in old, tight, and neglected strictures has caused distention of the bladder nearly to its full extent, the mouths of the ureters become enlarged, and by slow degrees the dilatation extends to the tubes, until they attain a size which in some instances is four, five, or six times greater than the original, thus constituting perfect supplementary receptacles for the urine from the kidneys. Occasionally the ureters have been found distended to an enormous size, and convoluted like an intestine. As the work of dilatation proceeds, in order to accommodate the urine from the kidney, the pelvis and infundibula undergo enlargement ; but at length the fluid coming to press on the glandular structure of the organs, causes its absorption, and nothing eventually remains except a membranous sac divided by septa into cells which contain some pus and urine.

CHAPTER IV.

TREATMENT OF STRICTURE.—Yielding and unyielding strictures.—Principle of cure.—Difficulties encountered in the management of small instruments.—Absorption of stricture by contact without penetration.—“Vital dilatation” a wrong term.—Employment of force condemned.—Extent to which dilatation of the urethra should be carried.—Strictures liable to relapse.—Secondary chronic cystitis.

THE *treatment of stricture*, though possessing two distinct relations, viz. to spasmodic and organic strictures, practically may be considered only in reference to the latter. We have already seen that *pure* spasmodic stricture is extremely rare, and as it depends on mental anxiety or some temporary derangement of the system, it rarely, if ever, becomes the object of any particular treatment. In those cases in which spasm is the result of inflammation, or a condition akin to it, in the urethra, it is to be viewed merely as an effect of the latter, and therefore need be regarded with especial concern, only when it leads to retention of urine. The treatment of permanent or organic stricture involves one of the most important and difficult practical studies in surgery. So far as their treatment is concerned, strictures may be divided into the yielding and unyielding; these terms are preferable to “passable” and “impassable,” “permeable”

and “impermeable,” which are wanting in logical accuracy. It is obvious that a stricture cannot be impermeable unless there be occlusion of the canal, while the possibility or impossibility of a stricture is relative, depending on the skill of the surgeon, the kind of instrument employed, and other circumstances, rather than on its absolute degree of closeness. The terms yielding and unyielding are less open to objection ; they relate to the process of cure, and mean such strictures respectively as obey or resist the bougie employed on the principle of absorption.

I. *Yielding Strictures*.—In books it is generally stated that the bougie cures stricture on the principle of “dilatation,” but a little reflection will render it evident that a perfectly organised structure, such as stricture, cannot be removed by a process purely mechanical. It is true that in general the instrument passes through the stricture by mechanically dilating it, but as soon as the dilating force is removed, the constriction regains its original state ; something more therefore must be done in order that a cure may take place ; the contact of the instrument stimulates the newly formed structure, and causes absorption of the lymph ; hence the term absorption as the principle on which the cure is effected is more correct than “dilatation.” The cure by absorption is carried out by the employment of bougies, which are constructed of various materials ; there are the plaster, gum-elastic, gutta-percha, cat-gut, and metallic. The best to use, as a general rule, particularly in recent stricture, is the gum-elastic. The first step is to explore

the urethra, and thus ascertain the seat of the stricture, its closeness, and degree of resistance ; for which purpose a bougie of about No. 8 size is the most suitable. Making the patient stand with his back against a wall, the instrument, to which should be given as much as possible the curve of the urethra, is to be introduced in a direction nearly parallel to the body, until it meets the stricture, which usually lies at or behind the bulb ; it is then to be brought down nearly to a right angle, and pressed gently backwards towards the bladder. Having learned all the particulars this step can furnish, we are gradually to descend in the scale of sizes, until we succeed in passing through the obstruction completely ; for it is an established fact that where the instrument is brought into contact with the entire extent of the stricture, the absorption of the latter goes on much more speedily and satisfactorily than where the contact takes place only at the surface. Having got fairly through the obstruction, we then gradually increase the size of the bougie, taking care to allow three or four days to elapse between each introduction, and to employ on each occasion the instrument last introduced before proceeding to one of larger size.

Where the aperture in the stricture is extremely close, it is necessary to employ an instrument of corresponding diameter ; the bougie of No. 1 size is very small, but we possess gum-elastic catheters smaller than No. 1 ; also the French bougies with delicate tapering extremities, and especially the cat-gut instrument. The latter is well suited in cases where the stricture is dense and elastic,

and lies anterior to the bulb. It should be curved at the point, as recommended by Sir Benjamin Brodie, and, being held rather long, is to be slowly introduced. When it first meets the impediment, it bends, and conveys the sensation of having come in contact with a firm unyielding obstruction. If, however, without changing the point at which the fingers hold the instrument, it be steadily pressed onwards, the stricture in general slowly gives way.

A particular advantage to be gained by the use of this instrument is that, when allowed to lie in the stricture for a short time, it swells from the heat and moisture, and thus expands the constriction to such an extent that after its withdrawal an instrument two or three sizes larger can be sometimes passed. The passage of a catgut bougie through a stricture, when dense and of long extent, imparts a peculiar friction-feel, so much so that the unpractised hand may be alarmed, imagining that the instrument is not taking its proper course along the urethra. Where the stricture is not particularly resisting, being difficult of penetration only on account of the smallness of its aperture, no instrument is so likely to pass as the French conical bougie. Some of these are exquisitely fine, and seeing their extreme delicacy and soft unresisting quality, it may well be imagined that they are useless; but they prove of great value in the hands of those who are sufficiently practised and possess a proper amount of tactile sensibility. We should hold the instrument short, and push it on bit by bit, slowly and gently, not stretching the penis much ; when a hitch

is experienced, let it be drawn back about half an inch, and then again directed onwards. When it gains its way through the obstruction, it feels quite loose in the canal, and one of the best plans that can be adopted is to retain it there for about twenty-four hours, as the urine can be readily discharged along its sides.

The successful employment, however, of small flexible instruments demands particular manipulative skill. Dexterity in the use of large bougies and metallic catheters is soon acquired, but the capability of skilfully managing soft and delicate instruments can only be gained by tutoring the tactile sensibility by careful and constant practice. Two principal difficulties are experienced in using very small and soft instruments ; one is to avoid their hitching in the lacunæ of the urethra ; the other to prevent them from turning at the point or coiling on themselves. The first, which it will be remembered is one of the sources of deception in exploring the urethra for stricture, often proves of great annoyance, because in cases of long standing the lacunæ become much enlarged, especially the “ lacuna magna,” which lies on the upper surface of the canal, about an inch or an inch and a half from the external meatus. The instrument will often hitch several times in succession, perplexing the surgeon, and leading the patient to believe that he has a double stricture ; the former, however, must exhibit patience. When the instrument encounters the obstruction, let it be withdrawn a little, and the direction of the point changed as it is being pushed on again ; by this manœuvre, though not perhaps until after several repetitions,

the pouches will be evaded. A very good means of avoiding the “lacuna magna” is to employ a small catheter mounted on a stilet well curved; let it be so held as to make the concavity look downwards, and be thus introduced as far as it can go; it should be then reversed, the stilet withdrawn, and directed straight on towards the bladder. Some of the French conical bougies are slightly bulbous at the extremity, and notwithstanding they may appear very ill-suited to pass through a stricture, they will be found in many instances the most efficient kind of instrument that can be employed, and are particularly adapted for avoiding the lacunæ.

The second difficulty can be experienced only by those who naturally, or from want of proper practice, are defective in tactile sensibility. When the point of an instrument has passed a stricture, there is cessation of resistance, which becomes at once obvious, and no impediment is perceptible as the instrument shortens; but if it coil up in the canal, then, in proportion as it shortens, the resistance increases. To recognise the resistance thus created demands in some cases acute sensibility; hence it is that the possession of the “tactus eruditus” is so important, and that it ought to be brought to as high a pitch of refinement as possible.

It has been stated that it is desirable to pass the instrument in the first instance fairly through the stricture, but such is not necessary to effect a cure; firm contact without entrance will in process of time lead to absorption, though with much less speed and certainty.

Accordingly, if, after a fair trial, we fail in getting an instrument to enter the stricture, the best course to adopt is to introduce a bougie of No. 4 size, and press with it for a few minutes ; this process is to be repeated every second or third day, or every day according to circumstances ; and generally it is observed that on each occasion the instrument advances farther and farther, until at length it suddenly slips into the bladder. The period that elapses before the stricture yields completely is very variable, and it depends in great measure on the length of time the contact is maintained. Generally a few days are occupied in the gradual progress of the instrument, but a very obstinate stricture will often yield in the course of two or three hours, under pressure exercised in the manner described.

The process that here takes place has been termed by Dupuytren “vital dilatation,” a vague and rather unphilosophical phrase. It is obvious that where a stricture yields to pressure maintained for a short time, the result is due to relaxation of spasm so frequently associated with it; and that where a longer time elapses before it gives way, the end is accomplished by the absorption of the adventitious structure, which, when the stricture is recent, takes place with remarkable rapidity. The phenomenon in question can therefore be explained without resorting to the hypothesis of a “vital dilatation.” But the knowledge of the fact that impenetrable stricture will yield in the manner described is invaluable, and Dupuytren deserves the highest praise for having directed special attention to this means of cure. He recommends a

small gum or metal bougie to be introduced, and pressure to be maintained with its point against the stricture for a few hours. The result is that the obstruction gradually yields, and the instrument, which could not by any manœuvre be got to enter it, makes its way slowly but steadily through, the time occupied in its onward course varying from a couple of hours to a few days.* This same plan is applicable, and more likely to prove effective in cases where the stricture can be entered to a slight extent, for then the point is fixed in the obstruction, and the pressure exercised is properly directed. The fact that stricture is amenable to this method of using the bougie is, I repeat, of the highest importance, since it shows that no necessity exists for the exercise of force to remove the obstruction. If we fail in getting an instrument to pass through at once, a few hours' or at most a few days' perseverance in the manner described will enable us to surmount the obstacle. Resort to force in the treatment of stricture cannot be too strongly

* I have made the following extract from Mr. Cusack's case-book, which he has been kind enough to permit me to use ; it bears well on this important practical point :—

“I commenced with the use of a plaster bougie on my second visit, and after a trial of every size was obliged to give over. I again tried at the interval of two days, but again failed. After a third trial I passed a middle sized silver catheter down to the stricture, and pressed it firmly against the obstruction, but without using sufficient force to overcome the obstacle ; I used the same means subsequently at the interval of two days, and at the third attempt I passed a small gum-elastic catheter with the stilet down to the stricture, and, pressing it gently forward, at the same time drawing the stilet, it passed into the bladder without any difficulty.”

deprecated. Surgeons are sometimes apt to take too mechanical a view of the subject ; regarding stricture only as a mechanical obstruction which must be removed by mechanical dilatation ; hence they act as if the object with which they deal is inanimate material, forgetting that, however dense and apparently unyielding the stricture may be, it is an organised structure situated in a part highly sensitive, and sure to resent rough usage. It is to roughness or violence in the manner bougies are handled that almost all the evils attendant on the treatment of stricture are to be attributed. So long as gentleness is observed, there is little fear of unpleasant consequences ; but where force is employed to overcome the obstruction, it rarely happens that the disease is not aggravated, and a host of untoward events is certain to arise. Besides, we defeat our purpose by resorting to force. If we want to discover a small aperture in a narrow canal, it is obvious the more delicately we feel with the instrument the more surely will our tactile sensibility guide us.

Whenever the stricture is situated in the membranous part of the urethra, or nearer the neck of the bladder, it is necessary to employ a curved instrument, a metallic one being the most likely to overcome the impediment ; but in all other situations the gum-elastic bougie, which can be slightly curved, and at the same time adapts itself to the canal, is the most suitable. It often happens, however, that after the bougie has passed through the stricture it is arrested, and its entrance into the bladder prevented from the presence of some impe-

diment in the neck of the organ, in the prostatic or membranous part of the urethra ; in such cases we must be content to direct attention exclusively to the stricture itself, and when its removal has been accomplished we may then have recourse to a curved metallic instrument, with the view of overcoming the posterior obstruction.

Now the application of instruments to stricture at intervals involves more or less a slow method of cure, and to which in consequence many are reluctant to submit ; time and circumstances on the patient's part may interfere with its being carried out properly and regularly, hence the surgeon is frequently urged to adopt some more expeditious mode of curing the disease. This can be attained by making the individual wear a catheter in the bladder, for which purpose one of gum-elastic material is decidedly preferable to the metallic. Some practitioners contend that a catheter of pure silver has the advantage on the ground of its smoothness, and its being less liable to phosphatic incrustation. But these advantages are not substantial, and are too light to weigh against the evils resulting from the presence of an inflexible material in the bladder. Whichever kind be employed, the instrument should be somewhat shorter than that in ordinary use, so as to prevent as much as possible the point from tilting against the fundus of the organ, and thus creating inflammation of the lining membrane.

The catheter first introduced should not be retained longer than thirty-six or forty-eight hours, after which time it will have become loose in the urethra ; it is then to be withdrawn, and one, two, or three sizes larger substi-

tuted. After the instrument has been renewed two or three times consecutively, it is prudent to leave the urethra in a quiescent state, and not to re-introduce one for twenty-four or forty-eight hours ; and this course is the more advisable when there is much mucous or purulent discharge, or any pain or soreness along the penis or in the perineum. After the catheter has been left out for a couple of days, the stricture may re-contract so far as not to admit the one last retained, under which circumstances an instrument of smaller size should be resorted to, instead of any force being employed ; thus we proceed in the graduation of instruments, until the caliber of the canal has been fully established. This is a very rapid and effectual means of cure, but cases occur in which it cannot be adopted.

Independently of the necessity that exists for the patient to observe strict quietude for several days, a condition with which many object to comply, the presence of an instrument in the bladder is apt to produce serious effects, the principal of which are cystitis, irritative fever, rigors, and orchitis. We must watch closely, and on the slightest appearance of any of these events the instrument should be withdrawn and no attempt made to reintroduce it until such result has entirely subsided, by which precaution even in difficult cases we can in general carry out the plan with complete success. An essential step for preventing the occurrence of untoward consequences is to keep the patient in bed and under the influence of opium. There are some persons, however, so extremely intolerant of instruments in the bladder,

that notwithstanding the precautions alluded to, this method of treatment cannot be carried into effect. Sometimes the surgeon finds that after he has removed the catheter for the purpose of introducing a larger, he is foiled in his object, which is a cause of extreme mortification to himself and disappointment to the patient. Where the canal has been dilated to a certain extent, there is but little chance of any difficulty being experienced in replacing the catheters; but in the early course of the treatment, when the instruments employed are necessarily small, and a corresponding degree of manœuvring required to introduce them, failure on one occasion at least may readily occur.

To obviate this contingency, Mr. Wakley, of the Royal Free Hospital, has invented an ingenious contrivance which is worthy of special notice. It consists of the following principal parts. 1st. of a very small silver catheter, thirteen inches in length and slightly curved at the extremity; the stem is quite straight, having at the end a worm for the reception of the screw of the connecting rod. 2nd. a steel rod which passes into the catheter as far as the screw, at which part both are to be united. The rod makes an addition of five inches to the length of the catheter. 3rd. straight silver tubes (eight in number) of graduated sizes; the first is only one size larger than the "index-rod," and the others regularly increase in circumference corresponding with the numbers of ordinary bougies; these tubes are nine inches long, are of a conical shape, and exactly fit the surface of the "index rod," which last acts as a

guide for the passage of the former. 4th. elastic tubes (their sizes corresponding with those of the silver tubes) composed of a flexible metal, covered with gum-elastic material. They also accurately fit the surface of the "index rod." The catheter is first to be introduced through the stricture into the bladder, and when this is accomplished the steel rod is to be screwed on. Next, No. 3 silver tube is to be passed on the "index-rod" fairly through the stricture. This tube being withdrawn, the others may all be passed in a similar manner and in regular succession. After the last metallic tube has been withdrawn, the important object of "keeping the command of the previous urethra" can be secured by passing one of the elastic tubes over the "index rod," as was done in the case of the silver tubes, and retaining it in the bladder.*

So much for the means ordinarily had recourse to for carrying out the principle of absorption in the cure of stricture. But here a most important question suggests itself: to what extent should we advance in the size of the instrument employed? This ought to depend altogether on the pathological nature of the stricture. In cases of short standing, especially where the adventitious deposit does not extend deeper than the sub-mucous tissue, it is rarely required to go beyond No. 8 or 9 bougie; but where the cells of the corpus spongiosum are involved, it becomes necessary, if we wish to do more than partly remove the morbid change of structure,

* The description here given of Mr. Wakley's instruments is in general terms that given by himself in the *Lancet* of March, 1851.

to dilate the canal to the full extent. To effect the requisite degree of dilatation, however, is often imprudent or impossible, since the means employed for dilating the strictured spot must of necessity overstretch the rest of the urethral canal. The external orifice is, in the normal state, the narrowest part, and in some cases it is remarkably contracted, so that an instrument of sufficient size for completing the cure of the stricture either cannot gain admittance, or its entrance is attended with pain ; and undue stretching of the neck of the bladder is sure to lead to very serious results, such as irritability of the organ, retention of urine, and rigors. Hence it is that the ingenious instrument invented by Mr. James Arnott, and to which he has given the name of the "fluid dilator," is so admirably adapted for employment in the cure of stricture formed by deposit in the cells of the corpus spongiosum. The following is the inventor's own description of the apparatus :—

"The fluid dilator consists essentially of a strong membranous tube, which is introduced into the stricture, and then distended with fluid by means of a powerful syringe. In its present improved state it will gradually open the contracted part to a diameter greater than that of the orifice or any other part of the urethra. It can be passed as easily as a bougie, and, when made expressly for the purpose, will enter a very tight or narrow stricture. As it dilates without moving forward at the time, there is none of the pain and injurious irritation from friction which is caused by instruments acting on the principle of the wedge, and no danger of piercing

the canal or forming a false passage. Another advantage of this eccentric or directly outward action is, that more dilating force may be exerted than can be safely used with the sound, which has a tendency in its progression to push forward the stricture, and tear it from the yielding canal. The rapidity of the dilatation effected by this instrument is also a valuable circumstance, saving much inconvenience and suffering, though of less importance than its durability and the safety with which it is effected. So long an interval has now elapsed since the first employment of fluid pressure in the treatment of stricture, that I have had abundant opportunities of ascertaining the permanency of its cures.

"The improvements recently made on the fluid dilator are, the substitution of a screw for the common piston-rod of the syringe ; of thick mucilage for water, as the injected fluid ; of a strong silk tube woven for the purpose, instead of the former one made of riband ; and of a mode of rolling up a waxed tube of this description, that it may pass without a wire into a narrow stricture. The instrument may now be considered perfect. The short silk tube, lined (when smallness of size is not required) with prepared gut on thin caoutchouc, is prevented from passing beyond the stricture in its earlier stages, in consequence of the bulk caused by securely tying its outer end upon the end of the metallic tube which conducts the fluid to it from the syringe ; but the other end of the silk tube near the point of the instrument, which is usually tied to the end of the elastic wire projecting from the metallic conductor, ought to be of

little size, in order that it may enter and be withdrawn from the stricture without friction. The syringe is connected with the conducting metallic tube by a piece of flexible tube, to prevent its jarring, and should be large enough to contain as much air and mucilage as will be required in one application. The screw piston-rod enables the surgeon to make a degree of distention that would burst the strongest silk tube, which is much more than the toughest animal texture could resist ; and as the amount of pressure can be exactly graduated by the screw, the patient may be desired to regulate this himself according to his sensations. I have seen a narrow stricture which had existed for years thus gradually dilated by the patient to the normal size of the urethra in one hour ; and though there will generally, in such cases, be some return of the contraction, the advantage is always proportionate to the extent of dilatation, provided this has been effected (as it usually is by the fluid dilator, and by this alone) without much irritation."

By this instrument the cure of stricture may be said to be effected on the double principle of mechanical dilatation and absorption. It possesses two obvious advantages, that of effecting rapid action, (which in some cases may be desirable) and of fully dilating the constricted part of the urethra without distending the rest of the canal ; and what gives it a marked superiority over all other kinds of dilators is, that the distending force is applied through a soft and uniform medium. There is one great barrier, however, to its general adoption—the difficulty of its being introduced ; but we must

hope that it may ere long undergo such improvement as will render it practically what in theory so largely belongs to it.

Another practical question presents itself in connexion with the treatment of stricture by means of the bougie, viz. is the cure by it permanent? Unfortunately it is too well known that, except in a very small minority of cases, the cure is but temporary. In incipient strictures, those especially which are formed merely by thickening of the mucous membrane of the urethra, a complete and permanent cure is sometimes effected ; but in all the instances in which the adventitious deposit involves the sub-mucous tissue, and particularly the corpus spongiosum, the stricture is certain to return a short time after the use of the instrument has been abandoned ; so that if the individual wishes to guard against relapse, he must submit to the passage ever after of a bougie every fortnight, three weeks, or month, according to circumstances. Some strictures have a stronger tendency to relapse than others. Every practical surgeon is familiar with the stricture termed "resilient," the peculiarity of which is its remarkable tendency to return. The canal may be dilated so far as to allow the passage of the largest bougie or catheter ; but after its employment has been discontinued for a few days, recontraction occurs to such an extent that an instrument of No. 5 or 6 size will be repulsed. In strictures characterised by this "resilient" disposition the corpus spongiosum is more or less involved, there being in some cases a complete transformation of tissue ; and probably where the resilient properties are much

exaggerated, there is also hypertrophy of both layers of the involuntary muscular fibres that enclose it. It is obvious therefore that, as the organic change lies so much beyond the sphere of the instrument, in order to produce an impression upon it the canal must be dilated fully ; for if the adventitious structure be not entirely absorbed, it soon becomes regenerated to its former extent. And doubtless the tendency to relapse, which is a peculiarity of these strictures, is due to the circumstance of our inability to stretch the strictured spot to an extent capable of causing the complete absorption of the morbid structure ; hence the instrument of Mr. Arnott, to which allusion has just been made, is particularly suited for employment in these cases, since by its means we have the power of fully dilating the stricture, without injury or inconvenience to the rest of the canal. The mode of treatment recommended by Mr. Syme, for the purpose of curing “resilient” strictures permanently, will come more appropriately under consideration in discussing the different operative measures.

But the treatment necessary in a case of stricture does not terminate on the removal of the urethral obstruction. If chronic cystitis co-existed, it is apt to continue after the cure of the stricture, and give rise to annoyance and distress for a long time ; thus the patient loses only one of the effects of the disease under which he laboured, viz. difficulty of micturition ; the pain and frequency in passing water persisting. This affection of the lining membrane of the bladder, though owing its origin to the stricture, is often in great measure dependent on, or at

least perpetuated by the strumous diathesis, which circumstance retards its cure. Sometimes the secretion from the mucous membrane is purulent, and these are the cases in which the bladder is most irritable, and which are most difficult of cure.

Now in this disease, where the secretion is decidedly purulent, I have seldom found the ordinary medicines employed for its cure to prove of any substantial service, I refer to buchu, uva-ursi, the balsams and turpentines; but injections of nitrate of silver judiciously used rarely fail in greatly benefiting the case, if not in effecting a cure. As a general rule, it is advisable to commence with a solution not exceeding one grain to the ounce, and to increase the strength very gradually. At first not more than two ounces of the solution should be injected, it not being left in the bladder longer than a few seconds. The interval between each adoption of this measure is to be every third or fourth day; but as we proceed with the treatment, the interval may be diminished, while the quantity of the solution introduced into the bladder and its strength are to be increased. It will seldom be found necessary to employ a stronger solution than ten grains to the ounce, and indeed it is generally imprudent to exceed this strength. There are, however, a few cases met with in which a solution of nitrate of silver, twenty grains or more to the ounce, will not merely be borne by the bladder, but is of service in that strength only; it seeming to exercise a sort of sedative action on the organ of which the weaker solution is incapable. When the strong solution is first injected, it gives severe pain, but

in a couple of hours after its withdrawal the patient experiences relief, and after this course has been put into effect a couple of times, he soon becomes conscious of a marked improvement, the frequency of the calls to pass water, the pain and the amount of secretion from the mucous membrane being all notably diminished. Where pain remains long after the use of the injection, opiate enemata or suppositories ought sometimes to be resorted to.

When the individual is young, and the secretion from the bladder is altogether purulent, the presumption is in favour of there being some constitutional cause in operation, in which case local treatment alone can be of no permanent avail. This point should be investigated, and if any particular state of the system be discovered, an endeavour should be made to rectify it. In some cases alterative doses of mercury, especially Plummer's pill with extract of hemlock and decoction of sarsaparilla, will be found of marked service ; in others the muriated tincture of iron will answer best, and sea-bathing ; but as is usually the case where the strumous diathesis is the source of the affection, it proves extremely obstinate, and yields only to such treatment therapeutic and hygienic as are suitable in other diseases of a like constitutional origin.

In the chronic cystitis occurring in connexion with stricture in elderly persons, the secretion from the bladder is generally mucous, at most semipurulent, and it rarely resists the action of buchu, pareira brava, the balsams, &c. When there is much admixture of mucus with the urine, the latter is often rendered alkaline, to correct

which state the mineral acids should be administered. Sometimes great benefit is afforded by occasionally washing out the bladder with tepid water or milk and water; or, where phosphatic deposit is observable, with water weakly acidulated with muriatic acid. Injections of nitrate of silver are not so necessary in cases of this nature as the former; still, where they prove obstinate, as sometimes occurs, the nitrate of silver must be resorted to, and its efficiency then becomes apparent.

But when stricture has existed long, if it be of a bad character, and especially if it had been much neglected, the kidneys are apt to become engaged. Now if the renal disease have amounted merely to excessive irritation or congestion of these organs, it in general subsides soon after the cure of the stricture has been effected, especially where the case is judiciously treated. Not so, however, if it have advanced to any considerable extent. Here, notwithstanding the complete removal of the urethral obstruction, the disease proceeds steadily, the kidneys are slowly disorganized, urinary hectic fever steals on, and the patient meets a miserable and lingering death, in spite of every measure that can be adopted.

CHAPTER V.

IMPEDIMENTS TO THE CURE OF STRICTURE ON THE PRINCIPLE OF ABSORPTION.—Spasm.—“ Irritable urethra.”—Rigors ; their different kinds.—Urethral hemorrhage.—False passages.—Sympathetic testitis.—Irritable bladder.

WHEN stricture is uncomplicated and the subject of it healthy, the process of cure by absorption proceeds smoothly and without the occurrence of any untoward result, if prudence and gentleness be observed in the employment of the bougie. But there are certain conditions co-existent with stricture which materially impede, or altogether defeat absorption, and these are either induced, or, if pre-existing, aggravated by the use of instruments, particularly when rudely or incautiously used ; sometimes, however, no amount of caution or gentleness can prevent unpleasant consequences.

One of the commonest circumstances which interferes with the success of the bougie employed for the cure of stricture is the co-existence of spasm. Every surgeon of any experience in the treatment of stricture is aware that an instrument, even one of considerable size, may be passed several times in succession with ease ; when, on some occasion, it becomes suddenly repulsed : this is due to spasm. In such cases it will be generally found that

the patient has exceeded in the amount of his wine, or has exposed himself to wet or cold, or otherwise passed the bounds of prudence, in consequence of which, slight inflammation, or a condition bordering upon it, is set up in the stricture or its vicinity ; and the irritation being propagated to the muscular fibres around, they are thrown into spasmodic action. Sometimes, however, spasm is encountered where none of these causes has been in operation ; and these are the cases, depending, as already described, on a peculiar state, which are so difficult of being dealt with. In any case, rough manipulation with the instrument, or too frequent or injudicious employment of it, is apt to excite spasm ; but where the predisposition to it exists, this event will be induced no matter how much delicacy and judgment be observed. Nothing is more vexatious and perplexing than to meet with a case in which this predisposition is strongly marked, since no progress can be made in the cure of the disease, the action of the instrument never failing to prove the exciting cause of the mischief which defeats the cure.

When we meet for the first time with opposition from spasm, no force must be employed ; let the instrument be gently and steadily pressed against the stricture, and the probability is the spasm will relax ; and if this do not occur with the instrument passed on the last occasion, one somewhat smaller used in the same manner may succeed ; if not, it is better to desist, and not have recourse to the bougie for a few days. In cases marked by a strong disposition to spasm, it being excited by trivial circumstances, especially by the contact of the

bougie, it is possible to evade it, and to bring the case to a successful conclusion by a proper administration of opium, and the adoption of certain precautions regarding the bougie. The instrument should be warmed and well oiled, and be slowly and gently passed ; it should be two or three sizes below what the stricture could be made to admit, and its size very gradually increased ; a longer interval than usual,—every five days or a week,—being allowed to elapse between each introduction. An opiate should be administered an hour or two before the bougie is employed, and a hip-bath afterwards.

By adhering to these precepts, the cure of the stricture will be in general effected without our being thwarted by spasm. When spasm is permanently associated with stricture, and not merely induced by the contact of the instrument, the judicious employment of chloroform may prove of essential service. Here the spasmodic contraction acts as an impediment to absorption, by rendering the stricture impenetrable. It therefore follows that by causing relaxation of the spasm we remove the condition that makes the stricture resist the influence of the bougie. I do not mean that the practice of making the patient inhale chloroform for this purpose is to be often adopted ; the plan ought to be confined to cases in which the spasm is unusually strong and the patient extremely irritable, and even here it is seldom necessary to resort to it oftener than on the first two or three occasions of using the instrument, for as soon as one of fair size can be introduced into the bladder, the disposition to spasm in general ceases or diminishes, the habit being as it were

broken. In some instances, however, the spasmodic tendency is so strong that, in spite of every precaution, our efforts to carry on the cure by absorption are defeated. Here it is far better to suspend the use of the bougie, and endeavour to correct the state upon which the predisposition depends. If we can trace it to a general irritable state of system, accompanied by gastric or hepatic derangement, we must prescribe accordingly, and set the latter functions to rights; but where the irritability of system is principally marked by debility, such as results in particular from habits of dissipation, then the preparations of iron, zinc, and valerian, together with sea-bathing, or salt water shower-baths, constitute the proper course to be pursued. As soon as the general health has been improved, and the condition of system which has generated the peculiar predisposition to spasm has been removed or altered, the instrument may be resumed with every prospect (should caution and prudence be observed) that no interruption to its use from this event will be experienced.

When the tendency to spasm depends on local irritability, much can be done to overcome it. Very often the "morbid sensibility" which is evidenced by extreme sensitiveness to the contact of an instrument disappears, after it has been employed a few times with gentleness and caution; but there are cases in which the bougie so much aggravates the irritable state of the canal, and thus increases the disposition to spasm, that it becomes impossible to persevere in its use; here the plan of touching the stricture lightly with lunar caustic, as recommended

by Sir Benjamin Brodie, should be adopted. After the nitrate of silver has been applied once or twice, the "morbid sensibility" becomes in general destroyed, or so much diminished as not to render any effective opposition to the treatment of the stricture. But where the local condition amounts to what has been termed "irritable urethra," it is very difficult of removal, and the stricture is in a proportionate degree unmanageable. In such cases, every time an instrument is passed, particularly should the precautions already alluded to be unobserved, spasm is not only apt to be encountered, but it continues for a long time after, and will often lead to retention of urine ; and all the symptoms belonging to the affection —the puriform discharge, scalding, and frequency in passing water—are increased. This irritable state of the urethra may be considered as remotely constitutional. It is true that it can be almost invariably brought home directly to neglected or badly treated gonorrhœa or gleet, or to mismanagement in the treatment of stricture, or to the circumstance of an attack of gonorrhœa supervening upon stricture ; but in all such cases there is in general some condition of system which predisposes to the irritable urethral affection, and this is, in the great majority of cases, the strumous diathesis. In not a few instances, however, the "irritable urethra" is traceable to gout. It follows, therefore, that to cure the "irritable urethra" it is an essential condition that the constitutional vice be remedied, and when the former is accomplished, the stricture can be readily made obedient to the bougie. The treatment includes a course of tonic medicine, sea-

bathing, and generous but non-stimulating diet. The preparations of iron, especially the muriated tincture and aromatic mixture, are undoubtedly the best.

Where spermatorrhœa constitutes a prominent feature of irritable urethra, we have a still more troublesome case to deal with ; there is often great debility and much mental depression, which demand very active tonic treatment. The medicine I have found most efficient for this purpose is the sulphate of zinc, which may be increased gradually from one to five grains three times a day, without its producing any annoyance to the stomach. Where there is much nervous excitability of system, as is generally the case when the spermatorrhœa amounts to any extent, the preparations of valerianic acid with zinc, iron, and quina will be found more applicable. It must be remembered, however, that in the case under consideration the seminal emissions are mostly secondary, so that when the “irritable urethra” has been removed they of necessity cease.

Another circumstance which complicates stricture, and always retards, often defeats, the treatment by the bougie is the occurrence of rigors. It must be borne in mind that rigors in connexion with stricture arise from two causes, the use of instruments, and as the result of the stricture itself, they being, as already noticed, constitutional symptoms or effects of the disease. In the latter case, they may occur where instruments have never been employed, and the subjects of them are mostly those of broken-down constitution, and especially persons who have resided in warm climates ; under

these circumstances the indication is to treat the stricture without any regard to the rigors. The other cause of rigors we have now to consider. In the great majority of cases the occurrence of rigors after the passage of instruments is due to rudeness in their introduction, or to their too frequent employment, or to some injudiciousness on the part of the surgeon. Sometimes, however, as in the case of spasm, there is a peculiar proneness to rigor ; so much so that often, in spite of the utmost prudence in the management of the case, it will occur every time an instrument is introduced.

The course usually adopted to prevent the occurrence of a rigor is to administer a full opiate immediately after the instrument is withdrawn ; this, however, often fails to produce the desired effect, and then it becomes necessary to administer a dose before as well as after the proceeding. Sir Benjamin Brodie recommends the retaining of a catheter in the bladder as the most effectual method of avoiding rigors. He is of opinion that the rigor always occurs after the individual has passed water for the first time subsequently to the use of the instrument, and that if the urine be prevented from coming in contact with the urethra, it cannot occur. There is no doubt that this plan frequently succeeds ; but there are many cases in which it cannot be adopted. There are some persons in whom the bladder is so extremely intolerant of the presence of an instrument, that an urgent degree of irritation is set up in the organ if one be retained there beyond a few minutes, and in others violent febrile disturbance is excited by the same cause.

The great inconvenience of carrying it out is but a minor objection to the plan. Sometimes, where there is much feebleness of system, sulphate of quina administered for a short time will have a marked effect in destroying the susceptibility to rigors, and if at the same time we are careful to pass the bougie gently, to increase its size very gradually, and to leave a long interval between each introduction, we may proceed with the cure of the stricture without interruption from this unpleasant event. But the predisposition to rigors from the use of instruments exists occasionally in so marked a degree as to bid defiance to every method resorted to for their prevention. Under these circumstances, if the treatment of the stricture be persevered in, the patient's health becomes completely broken down by the frequent recurrence of the rigors. In such instances the proper course to observe is to abandon the use of instruments altogether, and to adopt such methods as are best calculated to invigorate the health, the most efficient of which is change of air. We often witness the good effects of the latter step in the case of hospital patients. A man is under treatment for stricture ; every time an instrument is introduced rigor occurs, and febrile disturbance follows ; his constitution at length becomes completely shattered; every thing that could be devised for preventing the rigors and improving the health has been had recourse to, but to no purpose : here let all local treatment be abandoned and the patient sent to the country ; the result is that he returns in the course of six weeks or a couple of months with his health so much amended, and the susceptibility to rigors

subdued or so far altered, that the use of the bougie can be recommenced, and with good prospect of success.

The rigor under consideration is always followed by a hot and sweating stage ; a complete febrile paroxysm takes place, succeeded often by great prostration of strength. There is a form, however, met with in practice as the result of the passage of instruments, very different in its character and consequences from that just referred to. The rigor to which allusion is now made is feeble compared with the other ; it is not followed by a marked hot or sweating stage, nor does it glide into any febrile disturbance, and the debility which is sometimes apparent afterwards is due altogether to depression of the nervous system. Persons prone to this sort of rigor are mostly of a highly nervous irritable temperament, dyspeptic and hypochondriacal, complaining of various ailments which are referrible more to imagination than to actual physical derangement ; they exaggerate their feelings, give more than ordinary vent to the effects of the sensation of pain, and dread in particular the introduction of an instrument, which on the first few occasions is apt to cause sickness or fainting. Though the occurrence of such rigors does not lead to the same constitutional ill effects as the other, it is nevertheless important to prevent them, if, for no other reason, lest they be perpetuated through the force of habit. The treatment is sedative and tonic. Where much mobility of the nervous system exists, the preparations of valerian, particularly the valerianate of zinc, will be found highly advantageous, and also the daily use of the shower-bath.

On the first few occasions of introducing the bougie, it will generally be necessary to administer an opiate an hour or two previously, and it is well to give it in some warm aromatic vehicle. The opium, however, which is sure to increase the dyspeptic symptoms and constipate the bowels, should be omitted as soon as possible, and henbane substituted, or, what is often more efficacious in some habits, a glass of warm wine negus, or a little brandy and water.

A third circumstance which proves a very troublesome impediment to the cure of stricture by absorption is the occurrence of bleeding from the use of the instrument. As in the case of spasm and rigor, bleeding is generally the result of roughness or violence in the manner the bougie is handled, or from a want of due regard being paid to the kind or the quality of the instrument used, in consequence of which the lining membrane of the canal or the lacunæ are lacerated. But in some instances the stricture itself bleeds, and the gentlest touch of a bougie is often sufficient to cause it.

Strictures of recent formation are sometimes extremely vascular and pulpy, and the vessels in the neighbourhood of those of old standing are often so tortuous and dilated, and their parietes so thin, that a very slight degree of pressure is sufficient to rupture them. A similar state of vessels is met with in old persons in connexion with the "bar" at the neck of the bladder, and it is easy to conceive how readily under such circumstances bleeding will occur, owing to the pressure necessarily exercised by the tilting of the instrument against the fold. The

amount of the bleeding varies greatly, being sometimes not more than what barely stains the patient's linen ; in other cases it is profuse, and lasts two or three days. Generally the blood follows the withdrawal of the instrument in two or three successive jets, but very often no blood escapes until after the patient has commenced to make water, the urine continuing tinged for twenty-four hours or more after the passage of the instrument. The casualty of urethral hemorrhage, however slight, from the employment of an instrument, is sure to create alarm in the patient's mind, and a suspicion that it has not been skilfully handled ; while to the surgeon it becomes a warning to desist for the present from its further use ; and thus it is obvious that where the bleeding recurs constantly and is easily produced, the cure of the stricture must be indefinitely retarded. Accordingly, it is most important to adopt such precautions as will prevent any bleeding or diminish its amount. Conical and sharp-pointed instruments, and those of small size, should of course be avoided. The size ought to be as full as the stricture will admit ; it should be soft and yielding, so that it can adapt itself readily to the canal ; hence a gum-elastic catheter without the stilet in general answers best, and the extremity should be rounded or somewhat bulbous. The urethra ought to be rendered as straight as possible while the instrument is being passed, so as to lessen its curve, and accordingly the pressure of the point of the instrument on the floor of the canal ; and for the same reason it is advisable when the "bar" or any obstruction in the prostatic part of

the canal, or near the neck of the bladder exists, to use a curved instrument, particularly a silver one, which from its smoothness causes less friction. The straight instrument necessarily impinges against the floor of the membranous and prostatic parts of the canal in its progress towards the bladder ; but since the curved one describes a portion of a circle while being introduced, the point is rather directed from the floor, and can exercise comparatively little pressure. If these measures prove ineffectual, then it becomes necessary to adopt the expedient of retaining a catheter in the bladder, by which the stricture is speedily cured without the frequent recurrence of bleeding.

But the surgeon is sometimes called upon to take active measures for the arrest of the hemorrhage. The bleeding may be trifling at first, but after a short time it often reaches to a very considerable extent ; large coagula of blood are ejected in two or three successive jerks every now and then, and the patient becomes at the end of some hours quite pale and exhausted, alarm contributing materially to this result. When the blood comes from the prostatic part of the canal, it flows back into the bladder, and often leads when in large quantity to serious and troublesome consequences. If the stricture be situated in or about the bulb, and the aperture be close, well-directed pressure on the perineum will usually check the bleeding ; but should the situation of the stricture be further back, or the canal through it not much diminished, pressure is most objectionable, as it causes the blood to flow into the bladder, and thus leads to deception. In the latter case, if the urethra will admit one

of good size, a catheter should be introduced and retained in the bladder, by which means the pressure can be made more direct and effective; but should the urine continue sanguineous, it is better to withdraw it. Generally, however, by keeping the patient extremely quiet in the horizontal posture, and well under the influence of opium, the lower part of the body cool, and ice applied to the perineum, the bleeding will cease in twelve, or at furthest in twenty-four hours. But cases occur in which the hemorrhage proves very obstinate, lasting for three or four days; consequently, whenever it continues beyond twelve hours, it is advisable to administer gallic acid, which in large doses has often a magic effect, particularly where the blood comes from the prostatic part of the urethra. The two following cases illustrate how readily copious hemorrhage is produced by the employment of instruments, and how difficult of arrest it frequently proves:—

Mr. ——, a pale, delicate looking young man, was for some time under treatment by me for stricture of the urethra. Bougies were passed several times, without the occurrence of bleeding or any untoward result. On one occasion it was determined to make gentle pressure against the stricture, but unfortunately the instrument introduced for that purpose was slightly rough at the point, in consequence of a small break in the varnish, this condition not having been previously observed. On the withdrawal of the bougie hardly any hemorrhage appeared, but as soon as the patient arrived home he passed a considerable quantity of blood, not

only with the urine, but afterwards. The bleeding soon became very smart, large coagula being every now and then jerked from the urethra. The patient in a short time lost so great an amount of blood that he became quite pale and weak. He was kept in the horizontal posture on a couch, and ice was applied to the perineum, which, with the faintness resulting from loss of blood and anxiety, at the end of twelve hours combined to produce some abatement of the bleeding. Before, however, the same period had elapsed, the bleeding returned with renewed vigor, and the application of the ice seemed to lose its effect. It was now thought advisable to endeavour to arrest the hemorrhage by making pressure on the perineum. This was carried out by means of an oblong piece of cork and graduated compresses of lint, a bandage being placed over all—drawn so tight that the parietes of the canal could not fail to have been firmly approximated. A catheter was not introduced, owing to the difficulty experienced in getting one of fair size to pass. This measure seemed at first to have the desired effect, as no blood escaped externally; but on removing the bandage and compresses some hours after their application, for the purpose of enabling the patient to pass water, it was found that there was no material check given to the hemorrhage, for the blood had regurgitated into the bladder. In consequence of this event it was deemed advisable not to renew the compression unless a catheter of moderate size were introduced, which with a great deal of difficulty and trouble was happily accomplished. The addition of the catheter did not

however render the pressure more effective, for the blood notwithstanding continued to flow backwards into the bladder, as evidenced by discoloration of the urine, and the escape of coagula through the instrument. At this time forty-eight hours had elapsed since the commencement of the hemorrhage, and the patient was much exhausted. He was now placed on gallic acid in combination with opium, and the medicine soon began to manifest its action ; the ejection of coagula from the urethra ceased, but the urine continued sanguineous ; at the end of twenty-four hours, however, from the first administration of the gallic acid (being three days from the commencement of the hemorrhage) the bleeding was completely checked, and the urine became perfectly clear.

The next case has been copied from the case-book of Steevens' Hospital :—

T. T., aged thirty years, of irritable habit and delicate appearance, was admitted into the hospital labouring under a tight stricture of the urethra. The canal was gradually dilated, and a catheter of No. 10 size could at length be passed with facility. It was considered advisable to try an instrument of a larger size before the treatment of the case was abandoned, and No. 11 catheter was introduced into the bladder with very little if any difficulty. The surgeon was not conscious of having met with any resistance as the instrument passed along ; nor was there any sensation conveyed to his hand which would indicate a laceration or rupture of the lining membrane of the urethra ; as the instrument glided

along the prostatic part, the patient, however, experienced a peculiar feeling, not exactly pain. No blood followed the withdrawal of the instrument. In about an hour afterwards the patient was seized with a severe rigor, and he passed a little bloody urine, not without some difficulty. The desire to pass water returned in about half an hour, but he was unable to expel anything from the bladder. In a short time another rigor occurred, and this was followed by a violent paroxysm of dysuria, accompanied by pain in the perineum and along the urethra. An opiate draught was administered, which relieved the pain and tranquillized the patient, and in a short time he was enabled to pass a considerable quantity of urine, which was deeply tinged with blood and mixed with coagula. After this he enjoyed ease for an hour, but during this period pure blood kept welling up in the urethra constantly and slowly. Soon, however, the urgent desire to pass water returned, attended with severe pain above the pubes and along the urethra to the glans penis; but the patient completely failed in discharging either blood or urine. He now became extremely irritable and anxious. A moderate sized catheter was introduced, and about half a pint of very bloody urine was drawn off. In two hours afterwards the bladder became again distended, and the distressing symptoms returned, there being still inability to empty the organ. Accordingly a gum-elastic catheter of full size was passed into the bladder and secured there, for the double purpose of giving free exit to the coagula of blood, which were occasionally very large, and of in-

jecting the organ with cold water. The latter expedient proved perfectly successful. Six ounces were injected at a time, at intervals of about three hours ; and before the third application, the bleeding was in great measure checked. It returned in about the course of six hours, though not to the previous extent. The injections of cold water were renewed, and in the course of a very short time the blood altogether disappeared, and the urine passed quite clear through the catheter.

Appropriately in connexion with the consideration of urethral hemorrhage, is another very effectual impediment to the cure of stricture by the bougie,—the establishment of false-passage. This may be the result of the present efforts to introduce the instrument, or of previous treatment on the part of some other surgeon. Unquestionably false-passage, when it occurs to any extent, is due to unjustifiable roughness in the use of instruments. But there are a few cases in which the lining membrane of the urethra in the vicinity of the stricture is so extremely soft and lacerable, that a very slight degree of pressure with the instrument will cause it to tear. The experienced and skilful surgeon, however, does not make a false-passage of any extent; recognising from the sensation conveyed to the hand that the membrane has given way, he withdraws the instrument, and does not attempt to re-introduce it until after the lapse of some days, as soon as there is reason to believe that the injury is repaired. Very differently, however, does the rough and ignorant practitioner act. Wanting the proper tactile sensibility, and finding that

the instrument shortens, he pushes it forcibly on, and only learns it has taken a wrong course by the copious bleeding that follows, or where a catheter has been employed by the non-escape of urine. It is incredible to what an extent false-passages have been made, and the extraordinary course the instrument sometimes takes. Being forced out of the urethra in front of the stricture, it has been driven into the canal behind it, or thrust into the rectum, thus constituting a recto-urethral fistula, or, as is more usual, straight between the bladder and rectum. In the latter case the point of the instrument may reach as far as the cul-de-sac of the peritoneum, and if violence be done to it, peritonitis and rapid death are the inevitable consequences. A severe rigor sets in, sharp pain is experienced across the hypogastrium, increased by pressure; there are vomiting and great prostration of strength, the belly becomes tumid and tympanitic, hiccup follows, and the patient dies delirious or comatose in the course generally of forty-eight hours. But a false-passage may lead to fatal consequences from peritonitis indirectly, as shown by the following case :—

J—— C——, aged sixty years, was brought into Steevens' Hospital, reported to be labouring under retention of urine. His belly was swollen, tympanitic, and tender on pressure; his tongue was dry, brown, and furred; his pulse 140, small, and feeble; his respiration hurried and thoracic: in short, his symptoms were those of an advanced stage of peritonitis. The history of his case which was collected, was to the effect that, about ten or twelve days previously, having been seized with

retention of urine, an inexperienced surgeon had, in the attempt to relieve him, caused excessive pain and profuse hemorrhage, and failed altogether in drawing off any urine, which was subsequently effected by another practitioner. A few days before the supervention of the symptoms detailed, the patient, upon stooping down to the ground, felt as if "something gave way" somewhere in the vicinity of the bladder, which sensation was accompanied by violent pain across the abdomen. Immediately after his admission into hospital a catheter was passed into the bladder, but no urine escaped; a little welled up in the instrument, but could not be made to flow out. The symptoms rapidly advanced, his strength completely failed, and in the course of a few hours he sank and died.

Post mortem examination.—Upon opening the abdomen, there was found a considerable effusion of a yellowish-brown serum; and all the intestines were distended with flatus, and matted together with recent lymph. The bladder was contracted, thickened, and sacculated, and its lining membrane was very vascular, presenting patches of lymph in some places. The prostate gland was enlarged in all its lobes. Immediately in front of the middle lobe was a false passage, which could be traced taking its course between the bladder and rectum, and terminating in an abscess nearly the size of a hen's egg, which was situated close to the cul-de-sac of the peritoneum. This abscess contained some pus and urine, and was found to communicate upon the one side with the general cavity of the peritoneum

and on the other with the bladder behind the trigone. From the curious circumstance of the two communications which were discovered, it would appear most probable that the opening in the bladder was caused by the instrument at the time the false passage was made ; and that some urine having thus found its way into the areolar tissue between the bladder and rectum, led to an abscess in that situation, which, bursting through the cul-de-sac into the cavity of the peritoneum, gave rise to the symptoms of which the patient died.

Though the foregoing case is one of false passage in connexion with enlarged prostate, the useful lesson to be learned from it applies equally to stricture. Again, a false-passage may cause death from infiltration of urine. It is true that as the rent in the lining membrane lies in front of the stricture, in the majority of instances the casualty alluded to rarely occurs ; but if, as sometimes happens, the canal be perforated behind the obstruction, and especially in its upper wall, extensive infiltration must take place. We see then the serious consequences attendant on false-passage, and in truth the employment of force cannot be condemned in terms too unmeasured, since in order to cure stricture it is not necessary, as we have already seen, to pass the instrument through the obstruction.

In the case of retention of urine arising from very tight stricture, to make a false passage is a comparatively mitigable offence on the part of the surgeon, for the exercise of a certain degree of force is essential in order to effect the penetration of the stricture and to gain entrance

to the bladder ; and if the instrument, as may readily occur, comes to bear upon the lining membrane of the canal, instead of fairly against the stricture, some degree of laceration is inevitable. But where no such emergency exists, the object being solely the cure of the stricture on the principle of absorption, resort to force is unnecessary; and therefore the establishment of false passage is most unpardonable. Now of all the complications of stricture there is none that so completely defeats the cure by absorption as false-passage. Here an opening larger and more accessible than that of the stricture lies in front of the obstruction, inviting the entrance of the instrument, which generally being of necessity of small size, finds its way with the greater facility into the wrong course. It should be remembered that the false opening lies almost invariably on a plane below that in the stricture, and this suggests certain measures regarding the shape of the instrument employed, and its mode of being introduced. The instrument should in the first place be as large as it is possible to pass through the stricture, and it should be so curved as to insure its making a small circle around the pubes. The point should be kept steadily applied to the upper wall of the canal, and the handle depressed very early, by which manœuvres the false-passage will be best avoided. In spite of every precaution, however, it is often impossible to prevent the instrument from finding its way into the wrong course ; and it is most important to be able to recognize when this has occurred, lest, by continuing the effort to pass the instrument on, serious damage be done. A sudden jerk, in-

dicating that the point has slipped out of the direct road, is often perceptible, particularly in old cases ; and when the passage is of any extent, the instrument gets a twist which is quite observable when the one employed is metallic. If the surgeon wish to assure himself of the exact position of the instrument, let him introduce his finger into the rectum, when, if it be in the false-passage, it will be distinctly felt, being separated only by the thin wall of the gut. As soon as he has learned what has occurred, he should withdraw the instrument as far as the triangular ligament, and in passing it on again should take especial care to keep the point towards the upper wall of the urethra, so as to insure its coming to bear against the face of the stricture. In this situation it should be steadily maintained, a firm degree of pressure being made against the obstruction, which after a short time will in general give way, and the instrument then takes the correct course into the bladder. Where much difficulty is experienced in avoiding the false-opening, it is advisable, if other circumstances do not forbid it, to retain the instrument in the bladder ; hence it is important to endeavour to effect the penetration of the stricture with a catheter of gum-elastic material. If the obstruction be very close, we may succeed in passing through it a catgut bougie the point of which is well bent upwards, and by allowing it to lie in the obstruction a short time, owing to its swelling from the heat and moisture, it effects so considerable a dilation as to permit the introduction of a much larger instrument.

Another circumstance which sometimes interferes with the cure of stricture is swelling of one of the testes, caused by irritation of the ejaculatory ducts as the instrument is passing through the prostatic part of the urethra. Every time the instrument is passed the patient is seized in a few hours afterwards with a rigor, and in the course of a short time either testis becomes painful, and gradually swells more or less, fever follows, and occasionally there are nausea and vomiting. Now as this result is due to irritation of the terminal ducts of the testis, it may be avoided, especially if the stricture lie in the anterior part of the urethra, by merely passing the instrument through the stricture and no farther. Where, however, much irritation is created in the stricture itself by the introduction of instruments, it may be propagated backwards, and, reaching the prostatic part of the canal, produce the effect here alluded to.

The last material impediment to the successful employment of the bougie that need be considered is the occurrence of irritable bladder. With regard to this, it should be remembered that irritability of the bladder may be the effect of the stricture itself, as well as the result of the use of instruments for its cure; it is therefore prudent to ascertain from the patient at the earliest period all particulars, for if the irritability had existed prior to the case being subjected to any treatment, so far from the bougie being contra-indicated, its use should be steadily persevered in, even were the symptoms at first apparently aggravated thereby; whereas, if the irritability be traceable solely to the measures adopted for the

removal of the stricture, we must either abandon them, or employ such means as will prevent or diminish the ill effect thus produced. It is particularly necessary to observe the rules already laid down in the case of spasm and rigor, viz., to use the instrument very gently, to increase its size gradually, and to leave a long interval between each introduction. Anodynes and those agents which exert a sedative action on the bladder should be administered, and by such course judiciously carried out, as the stricture undergoes absorption, the irritable state of the bladder in general subsides. Persons of nervous irritable habit are especially prone to this result from the employment of instruments. Very often the effect amounts merely to frequency of micturition, there being impossibility of retaining the urine beyond a short time, but no pain, scalding, nor other unpleasant accompaniment; sometimes there is an absolute increase in the quantity of the urine secreted, which is paler and of lower specific gravity than normal. The remedy best suited to this particular case I have found to be the muriated tincture of iron, and especially the adoption of a general tonic plan of treatment, in which sea-bathing should be the first consideration. Under such a course we can carry on the treatment of the stricture by the bougie without any interruption.

CHAPTER VI.

TREATMENT OF UNYIELDING STRICTURE :—Method of effecting ulceration of stricture.—Destruction of stricture by caustic ; nitrate of silver ; potassa fusa.—Internal division of stricture.—Sir B. Brodie's modification of Stafford's operation.—Division of stricture at the orifice of the urethra.—Division of stricture through the perineum.—Ordinary operation.—Mr. Syme's operation ; its merits and demerits discussed.

IT has been already shown that strictures may be relatively unyielding, proving disobedient to the bougie owing to a variety of incidental circumstances, which are partly complications of the disease and partly the result of the employment of the instrument. But there are strictures which are absolutely unyielding, being from their intrinsic nature quite unsusceptible of the stimulus of the bougie. These can only be overcome by one of the three following methods, viz : pressure so exercised as to cause ulceration of the adventitious structure ; the application to it of caustic ; or the division of it with a cutting instrument, either within the urethra or through the perineum.

As regards the first method, that of effecting ulceration, there are two modes of carrying out this principle of cure :—1st. if the stricture be passable, by rapidly increasing the size of the instrument ; 2nd. by maintaining

pressure against the face of the stricture by means of a bougie retained in the canal. The former is no doubt a very expeditious method of removing stricture, but it is far from being devoid of danger; severe rigors, inflammation of the urethra, and retention of urine are apt to be induced. The second method is uncertain in its effect, and is slower and more likely even than the other to lead to evil results. Many forms of apparatus have been invented for the purpose of submitting stricture to continued pressure, but they are all wanting in one essential particular, that of being able to retain their proper position, the slightest stir of the pelvis causing the instrument to shift; and it is obvious that if the point should come to bear on the floor of the urethra instead of against the stricture, pain and inflammation of the canal which may lead to perineal abscess will be produced, and, should the pressure be considerable, perhaps a false-passage. The only satisfactory contrivance for effecting ulceration by continued pressure against the stricture is, I have found, by passing a strong gum-elastic bougie of conical shape, and about No. 8 size, down to the obstruction, and making the patient himself hold it *in situ*. In a short time generally the apex will enter the stricture; thus the pressure becomes effective, as the instrument is fixed and cannot shift its position. During the day it must be withdrawn at stated times, to allow the patient to pass water, being immediately re-introduced by the surgeon. At night it must be left out, unless the point can be so far passed into the stricture as to admit of its being firmly grasped, and then, with the

assistance of tapes, it can be readily secured against the effects of any movements which may occur during sleep.

If this plan be properly and steadily carried out, it will be found that the instrument advances gradually towards the bladder, very obstinate and callous strictures being often unable to resist the slow, steady, and continuous pressure thus brought to bear upon them. The cure of stricture by ulceration, however, is one to be avoided if possible, since besides the evil consequences already detailed, there is reason to believe that cicatrices are left in the canal, which must lead to recontraction, and generally to a more obstinate form of obstruction. The plan is also very painful, and in persons of very irritable habit it cannot be tolerated. But there are cases, in which the surgeon is driven to resort to the attempt to cure stricture by this means, and it frequently succeeds without any untoward occurrence when the urethra and bladder are tolerant and the patient of good constitution ; but in all cases the aid of opium must be enlisted.

The second method, that of destroying stricture by means of caustic, is now rarely adopted. With the exception of some very rude contrivances, by which at an early period of the history of surgery they were employed, the practice of introducing an escharotic into the urethra as a means of effecting the destruction of stricture is due to John Hunter, the nitrate of silver being the agent he used for the purpose. Sir Everard Home subsequently took up the measure, and warmly advocated its claims ; but as in the case of every proceeding which

is carried out with strong prejudice in its favour, he did not restrict its use to any special cases, employing it in every form of the disease, a circumstance which mainly contributed to the downfall of the practice. At the commencement of the present century Mr. Whateley suggested the application of potassa fusa to stricture, and endeavoured to show that it possessed greater fitness for the purpose of destroying the disease than the nitrate of silver, on the ground of its escharotic action being so much more energetic. But the greater power it possesses in this respect, as well as its deliquescent nature, constitutes the objection to its employment; hence it fell rapidly into disuse. Mr. Wade of London recently revived the use of the caustic potash in an improved manner, and he maintains that there are few cases to which it is inapplicable. The introduction of any kind of caustic into the urethra is, however, most objectionable, the mildest form of it being apt to produce very serious results, such as rigors, hemorrhage, abscesses, infiltration and retention of urine. Again, to employ caustic in such a manner as to destroy a stricture by sloughing is not so feasible a thing as may at first appear. The action of nitrate of silver is mild, so much so that even in the case of a mucous membrane it is necessary to maintain contact for a considerable time before a superficial slough is formed ; and it is obvious that were the agent retained in the urethra so long as to admit of a sufficient caustic effect being expended on the stricture, the adjacent part could not escape, and thus great mischief might result. The potassa fusa is, no doubt, fully

equal to the complete and rapid destruction of any stricture; but its power is so great, and from its deliquescent quality it is so impossible to limit the action, no matter what description of contrivance be had recourse to for carrying it to the seat of the stricture, that it has never been used except in extremely minute quantity, and retained in the canal only momentarily. Even Mr. Whateley expressed it as his opinion that when employed in the safe and proper manner, this caustic agent does no more than exercise a sort of disintegrating, or, as it were, solvent influence upon the organised product constituting the stricture.

We see, then, that to cause the sloughing of stricture by the application of caustic with any efficiency is practically unattainable, and that the introduction of caustic into the urethra at all is hazardous. There is another objection to the use of caustic, grounded on the fact that when its effects extend deeply, a cicatrix must be left in the canal. In practical surgery there are, however, few modes of treatment that can be altogether expunged; the field of our resources can hardly be made too wide.

Cases of stricture occur in which the use of a chemical agent is indicated on negative grounds, from the failure of ordinary means, and the necessity of otherwise resorting to severe methods, or such as the patient will refuse to submit to. Undoubtedly, the nitrate of silver is the best and safest caustic agent to employ; but if it is to prove successful, we must be very careful to select the proper case for its use. In long stricture the treatment by the application of caustic is inadmissible; it should be re-

stricted to the short forms, especially those which are cartilaginous and knotty. The best means of applying the nitrate of silver is, I think, that recommended by Sir Everard Home. The round point of a common plaster bougie being cut off, a small depression is made with a knife in the end of the instrument, and into this a piece of lunar caustic is inserted. An unarmed bougie is to be first introduced, in order to ascertain the exact seat of the stricture, and its distance from the orifice of the urethra ; this extent is then to be measured off on the armed instrument, and a mark made on it with the nail, to designate the spot beyond which it is not to be introduced. The penis being firmly though not tightly grasped behind the glans, the instrument furnished with the caustic is to be quickly passed along the urethra until the mark upon it arrives at the orifice ; it is then to be pressed firmly and steadily against the stricture for half a minute or longer. This process is not to be repeated oftener than every fourth day, and few cases suited to the application of caustic will demand it more than on two or three occasions. The superficial slough produced is cast off in the course of three or four days, either entire or in minute shreds, and thus the adventitious structure becomes regularly fined down. In uneven knobby strictures of long standing the application of caustic is often very useful, by removing the little irregularities which render the canal through them tortuous, and thus interfere with the passage of an instrument. But even this, which may be termed partial application of caustic, is apt to lead to the serious consequences previously mentioned,

especially rigors, where the individual is of an irritable unhealthy constitution. It follows then that under any circumstances the treatment of stricture with caustic is to be avoided, even in the cases best suited to it, except when the ordinary methods have failed. The nitrate of silver, however, it must be remembered, may be used with a very different object from that here described, viz : to destroy morbid sensibility of the urethra, and the tendency to spasm associated therewith, and thus render the stricture more amenable to the bougie.

The third method is division of stricture by means of a cutting instrument, and I shall first speak of its division within the urethra. Various contrivances have been devised for effecting this object, and amongst those who have invented such, no one has signalised himself more than Mr. Stafford. All the instruments designed for the purpose act in one of two ways, either by a lancet-like blade being pushed forwards through the stricture, or by a narrow flat blade being protruded from a sheath passed into the obstruction. Both these methods of effecting the internal division of stricture are objectionable. In the first instance, seeing there is no guide to the cutting part of the instrument, if the stricture be in any spot of the canal posterior to the bulb, serious and irretrievable damage may be done; while in the other case, if any instrument of the size of that which holds the concealed knife can be fairly passed into the obstruction, the cutting of the adventitious structure is unnecessary, since its removal can be accomplished by other and safer means, which have been already fully considered.

Where the stricture is impassable in the ordinary acceptation of the term, and is situated in the usual locality somewhere behind the bulb, division through the perineum is far safer and better than any method of internal division that can be devised; but not so with obstructions occupying a spot in that portion of the urethra anterior to the scrotum; here the operation of the external division is apt to be followed by fistula difficult of cure, while the stricture can be divided within the canal with comparative safety and ease, if the proper instrument be employed and due caution observed. I have seen more than one case in which, the urethra being obliterated from an extremely close contraction, and the urine coming through a fistulous opening behind it, the canal was perfectly established by a skilful and judiciously directed division of the obstruction.* In all cases, however, internal division is attended with more or less risk and unpleasant effects; it should be therefore avoided if possible. Sir Benjamin Brodie recommends a modification of Mr. Stafford's operation, which he performed with very satisfactory results upon one occasion.

"The patient having been placed in the same position as in lithotomy, a full-sized plaster bougie was introduced, and held by an assistant with its extremity resting against the stricture. I then made an incision in the

* Mr. Hamilton of the Richmond Hospital, has reported some cases in the 38th No. of the *Dublin Quarterly Journal of Medical Science*, in which internal division of stricture in the penis portion of the urethra was satisfactorily accomplished, especially one where Civiale's instrument was employed.

perineum, dilating the fistulous sinus, and laying open the membranous part of the urethra as far forward as the stricture, the exact situation of which was marked by the bougie. The bougie was then withdrawn, and an instrument was introduced in its place, consisting of a straight silver tube, closed at its extremity, except a narrow slit, through which a small lancet could be made to project by pressing on a silet which projected the handle of the instrument. The round extremity of the tube being pressed against the anterior part of the stricture, I applied the forefinger of the left hand, introduced through the wound in the perineum and urethra, to its posterior surface. The pressure of the instrument being distinctly communicated to the finger through the substance of the stricture, the lancet was protruded, and the stricture was divided. A silver catheter was then easily introduced through the urethra and the divided stricture into the bladder, and allowed to remain there. The urine of course flowed through the catheter. At the end of two days the silver catheter was removed, and replaced by one of elastic gum. The wound in the perineum gradually healed, and the patient ultimately recovered, making water in a full stream, and being able to introduce a sound of a full size into the bladder, so as to prevent a recurrence of the contraction."

The advantages Sir Benjamin Brodie considers that this operation possesses are, "first, that the free opening made in the perineum prevents all danger from infiltration of urine; secondly, that the forefinger of one hand, being applied to the posterior surface of the stricture,

serves as a guide for the lancet, and enables you, with the exercise of a little skill and caution, to make an exact division of the stricture."

When the contraction involves the external meatus of the urethra, being caused as is almost invariably the case by a cicatrix resulting from chancre, it is so dense and unyielding that no measure short of its complete division with a cutting instrument can effect any good. For this purpose all that is required is to introduce a small director through the obstruction, and to cut upon it with a bistoury, whereby the induration is freely slit; when this is accomplished, a piece of gum-elastic bougie or catheter is to be introduced so as to prevent recontraction.* Sometimes phagedenic ulceration destroys a considerable portion of the glans, leaving the meatus an irregular depression to which the skin of the prepuce is in general adherent. To cure this species of contraction the following operation adopted by the late Mr. Colles is to be recommended :—" Having detached the skin from the end of the urethra, to which it is generally intimately adherent, I divide the urethra below, to the length of more than half an inch. I raise the mucous membrane from each lip of the incision, then cut away a portion of the bared corpus spongiosum to such an extent as will allow the raised mucous membrane to cover the cut edge. I stitch down this membrane upon the corpus spongiosum, and thus having covered each lip of the wound by mucous membrane, I have effectually guarded

* In the essay by Mr. Hamilton above referred to, cases are given in which this operation was successfully performed.

against the possibility of reunion of the lips of the wound, or subsequent contraction of the opening. The opening of the urethra thus produced is of course of a size larger than natural."

The second plan, division from without through the perineum, is undoubtedly the safer and more perfect method of dividing stricture when it lies at or behind the bulb. The operation may be said, in general terms, to consist in introducing a metallic catheter, sound, or staff as far as the obstruction, cutting upon it, and carrying on the incision so as to divide the whole extent of the contracted part ; and, when this is accomplished, passing a catheter from the external orifice of the urethra into the bladder, and retaining it there until the incision in the perineum has nearly healed up. The details of the operative steps are as follow :—The patient is to be placed on a table, and tied up as if for lithotomy. A metallic catheter or staff is to be introduced along the urethra, and to be held firmly against the stricture by an assistant. An incision is now to be made directly in the mesial line of the perineum, from above the commencement of the stricture to within a short distance of the anterior angle of the anus, and the urethra is then to be opened by cutting directly on the point of the instrument. This done, a small grooved director should be passed through the contracted part of the canal, and the indurated structure divided upon it with the knife. Sometimes the stricture is so close as to render it impossible to pass even a probe through it, and in such instances the surgeon has no option except to carry on the knife as steadily as

he can in the central line as far as he thinks the contraction extends. When the urethra has been fairly laid open, a gum-elastic catheter is to be introduced along its entire course into the bladder, and retained there. Now this operation is objectionable on many grounds. If a director can be passed fairly through the obstruction, so as to admit of its complete division, the operation is perfect ; but this necessary condition is frequently unattainable, in which case the incision is carried on at random, there being no guide to the knife ; hence, while the division of the contracted part must be in all probability incomplete, considerable risk of mischief is incurred. Sir Benjamin Brodie thus truly expresses himself with regard to this operation :—“ Even under the most favourable circumstances, it cannot be otherwise than doubtful whether the stricture be properly divided ; that is, whether the incision has passed through the narrow canal in the centre, or through the solid substance on one side of it. I suppose that no surgeon would recommend such an operation except as a last resort, where no instrument could be made to pass through the stricture by other means.” Again, it has happened that though the urethra has been opened, the aperture could not be discovered ; the patient, after having been detained for a long time on the table, being brought back to bed without the end having been obtained.

Sometimes I have known the stricture to have been apparently divided, and nevertheless it was found impossible to pass a catheter from the external orifice of

the urethra into the bladder ; in such cases the best course to be pursued is to introduce a gum-elastic catheter directly into the bladder, through the incision in the perineum, and at the end of three or four days, when suppuration has been established, the urethra will in general admit of the passage of an instrument from the external orifice. I have sometimes succeeded by bringing the end of the catheter through the cut in the perineum, and then passing it in again in the form of a curve ; for this purpose it is of course necessary that the instrument should be of gum-elastic material, and be used without a stilet.

There is, moreover, serious risk of hemorrhage in this operation, and even where the stricture has been divided in the most satisfactory manner, there is always this prospective disadvantage arising from it, that if the bougie be not regularly and properly employed ever after, recontraction will occur, and a worse kind of stricture be thus substituted. All these are weighty considerations, and are sufficient to make the surgeon pause ere he resort to this operative procedure. Cases, however, occasionally occur in which, owing to the complete failure of all other methods of cure, no alternative is left but to adopt it. My father spoke of this operation in the following terms : " There are cases of old and neglected stricture which resist all means of treatment which I have mentioned. Are we to abandon such cases, and leave the sufferers to drag on a miserable existence, perhaps for years ? No : there is still a hope of being able to afford relief in such cases, if not a cure. The means I allude to is the

dividing the stricture with a knife. There are many highly respectable surgeons who object to this operation, on the ground of the difficulty of performing it, and its often failing. I am fully aware of the difficulty of performing this operation, particularly in cases where the stricture is situate about the membranous part of the urethra. If the case is complicated with a thickening and hardness in the perineum, and one or more fistulæ, then indeed it is no easy matter to expose the urethra, to open it, and, when opened, to find the orifice so as to enable us to pass a catheter through it into the bladder. I have known a patient to be left on the table for more than half an hour, and afterwards put to bed without having a catheter passed. This I think is very bad practice, to keep a patient, who must be in a delicate state of health previously, so long exposed, and under the influence, I may say, of an operation. If the opening is not discovered in a reasonable time, the patient should be sent to bed, and when suppuration has taken place, which will be after about three or four days, then the opening will be found."

But a method of dividing stricture by an incision carried through the perineum was first employed in the year 1844 by Mr. Syme, on a modified principle, and with a very different object from that involved in the operation just described. In the latter case, external incision of the stricture is had recourse to only as a last resort, the impenetrability of the obstruction being the sole ground for its adoption; whereas an essential condition for the performance of Mr. Syme's method is the possi-

bility of introducing a staff into the bladder, and its object is mainly to afford "a more speedy, safe, and permanent cure than simple dilatation." There are two forms of stricture in which Mr. Syme recommends his operation—"in one of these the contracted canal is so extremely irritable that the introduction of an instrument aggravates instead of alleviating the symptoms, and exposes the patient to various dangers from the local and general disturbance thus excited. In the other, the peculiarity consists in a contractile tendency so strong as quickly to counteract the effect of dilatation, and thus render it useless."

The following are the words in which Mr. Syme describes his own operation :—"He should then be brought to the edge of his bed, and have his limbs supported by two assistants, one of them standing on each side. A grooved director, slightly curved, and small enough to pass readily through the stricture, is next introduced, and confided to one of the assistants. The surgeon, sitting or kneeling on one knee, now makes an incision in the middle line of the perineum, or penis, wherever the stricture is seated. It should be about an inch or inch-and-half in length, and extend through the integuments with the subjacent textures exterior to the urethra. The operator then taking the handle of the director in his left, and the knife which should be a small straight bistoury in his right hand, feels, with his forefinger guarding the blade, for the director, and pushes the point into the groove behind, or on the bladder side of the stricture,—runs the knife forwards so as to divide the

whole of the thickened texture at the contracted part of the canal, and withdraws the director. Finally, a No. 7 or No. 8 silver catheter is introduced into the bladder, and retained by a suitable arrangement of tapes, with a plug to prevent trouble from the discharge of urine. The process having been thus completed—which it may be in less time than is required for reading its description—the patient has merely to remain quietly in bed for forty-eight hours, when the catheter should be withdrawn, and all restraint removed."

Since Mr. Syme's first operation he has performed it several times, has modified the after-treatment in some respects, and devoted much consideration to the subject in all its details. He particularly urges the importance of making the incision exactly in the mesial line; points out the necessity of not dividing the deep fascia of the perineum, so as to guard against extravasation of urine; and recommends that the catheter be kept in the urethra not more than forty-eight hours as a general rule, or seventy-two at farthest; and that some days should be allowed to elapse before it is re-employed. Undoubtedly this operation is a vast improvement upon the old method of dividing stricture, which was difficult, dangerous, and imperfect; it being often a matter of chance whether the aim of the operator was accomplished. Mr. Syme's modification of it is at once simple and perfect, and as a grooved director is offered to the knife, the operation is comparatively free from danger. But then there arises the important question, are the objects contemplated by this particular method attained? And allow-

ing that they are, does the end justify the means? Much difference of opinion exists on these two points, though latterly the extreme prejudice with which the operation was met has in a great measure subsided. At first nearly the whole profession in Great Britain protested loudly against it, and the arguments energetically urged against Mr. Syme's operation were based mainly on the following grounds :—

1st. That except as a last resource any cutting operation is unjustifiable.

2nd. That independently of the ordinary dangers resulting from a cutting operation, there is in this one special risk from hemorrhage.

3rd. That as an instrument must be passed through the stricture in order to the performance of this particular mode of operating, the disease ought to be cured by the employment of bougies.

4th. That it is irrational to suppose the division of a stricture with a knife can afford a permanent cure, it being rather in accordance with preconceived ideas to suppose that the cicatrix left by the incision would eventually lead to a more intractable kind of obstruction than the original.

Let us examine these arguments. Undoubtedly it appears unjustifiable to resort to such an operation as Mr. Syme's except in event of the complete failure of ordinary means, and it seems the less called for where an instrument (which is often the case) so large as No. 6 can be passed through the stricture; but then the exact objects for which Mr. Syme recommends its adoption

must not be forgotten. Every surgeon must have met with the two kinds of stricture described by Mr. Syme as requiring his method of treatment, and certainly the difficulty of managing such satisfactorily by the usual plans, and the long continued source of annoyance to the patient resulting therefrom, are sufficient grounds to justify any operative measure that is not fraught with unusual danger.

The first kind of stricture referred to by Mr. Syme, though very troublesome, may be overcome by means which have been already noticed ; and indeed it is difficult to understand *a priori* how division of the stricture can remedy its peculiar character. Cases, however, marked with a strong tendency to relapse are decidedly beyond the power of bougies or catheters so far as permanent cure is concerned. All strictures, except those of recent formation and very simple pathological character, are sure to return after the use of the instrument is abandoned for some time ; but in the case of the peculiar stricture under consideration relapse occurs immediately upon the cessation of treatment, it being no uncommon occurrence after the urethra has been dilated so far as to admit an instrument of No. 12 size, for recontraction to take place in the course of two or three days (should the use of the bougie be discontinued for that time) to an extent that prohibits the introduction of No. 4 size. In such strictures absorption takes place with remarkable rapidity, by retaining catheters permanently in the bladder; indeed their yielding occurs with so much obvious ease, that it is calculated to create the impression of their

being extremely amenable to treatment; but experience shows that they recontract with equal rapidity, for should the catheter be left out of the bladder for a couple of days, the stricture falls back to its original closeness, and the work of graduated instrumentation must be recommenced. Thus a case may go on for years, the good done by the employment of bougies and catheters being but transient. Certainly if Mr. Syme's operation is capable of affording a permanent cure of this obstinate and troublesome kind of stricture, there can be no doubt it possesses an immeasurable advantage. It must be admitted that as an operation his method is perfect, and we have now sufficient evidence furnished by cases to satisfy the mind that the mortality resulting from it is extremely small, that we need not anticipate any unfavourable results beyond what are common to all cutting operations of the simplest kind, and that the event which was at one time chiefly feared, namely hemorrhage, seldom occurs, at least to any alarming or troublesome extent, if the directions given by Mr. Syme in regard to the mode of making the incisions be observed.

But the great question, and the one which is the turning point of the discussion upon the operation, is this, does it give perfect immunity from relapse, and is the argument (No. 4) which has been adduced against it devoid of foundation? Full and extended statistics can alone furnish the reply, and these are still wanting. It is true we already possess a mass of statistical evidence gathered from many cases operated on by Mr. Syme and other surgeons throughout Great Britain, sufficient to

bring conviction that the operation possesses the power comparatively of subduing the tendency to relapse; but in order to establish whether the cure be permanent in the strict sense, the patients operated on should be kept under observation for a long time afterwards, and this is in most instances unattainable. It is easy to understand how the complete division of the stricture should effect the desired object temporarily, but that recontraction should eventually occur. The lips of the incision are made to heal by granulation, and the soft and yielding structure thus formed admits of being easily stretched; so that if the use of the bougie be continued, the caliber of the canal may be preserved for some time. But let us suppose two years or more to elapse from the date of the operation, the use of instruments having been abandoned, how may the case stand? The edges of the incision in the urethra, especially if the original adventitious deposit was extensive, may thicken after some time, and the newly formed membrane, though soft and yielding at first, may after the lapse of several months, especially when it is no longer subjected to the distending force exercised by a bougie, contract and become indurated, which must of necessity diminish the caliber of the canal. It is true that a small number of cases has been recorded in which the stricture did not return, though several months had passed since the operation was performed; but the inference to be drawn from this fact is counterbalanced by the circumstance that in a few relapse has unequivocally occurred within the same period. We cannot draw correct conclusions from a few

cases, and if the majority has not been followed up with the view of ascertaining their ultimate state, we should await further statistical information before forming a final judgment as to how far this operation can insure a permanent cure. Should it appear that Mr. Syme's method only gives some months' exemption from relapse, and demands the use of the bougie ever after, then it would be questionable how far such partial advantage justifies this operative measure; at least, if it cannot guarantee against relapse at a remote period, the cases in which it is admissible are obviously very few. It must, however, be admitted that Mr. Syme's method of dividing stricture is, as already observed, in its character as an operation simple and perfect, and it is moreover to be reckoned amongst the many proofs of surgical skill and originality furnished by its distinguished proposer.

CHAPTER VII.

RETENTION OF URINE.—From acute urethritis.—From organic stricture, superaddition of spasm the chief cause.—Symptoms and progress of complete retention.— Mechanical and remedial means of relieving it.—General conclusions.—“Forcing stricture.”—Opening the urethra behind a stricture.—Paracentesis vesicæ.

COMPLETE retention of urine is an untoward event that may arise at any period in the progress of stricture of the urethra, and it is the one, perhaps, to meet which are demanded the most skill, promptitude, and decision. It may occur from the three kinds of stricture which have been described, viz :—the spasmodic, inflammatory, and organic; but with extreme rarity from any of these separately. Pure spasm, as has been before observed, very seldom occurs, but the combination of spasm with inflammation of the lining membrane of the canal and with organic stricture is extremely common, and is almost invariably the cause of the retention of urine so apt to arise in both these cases.

Tumefaction of the lining membrane from acute inflammation could hardly *per se* produce occlusion of the canal, but the irritation being propagated to the surrounding muscular fibres, they are thrown into spasmodic

action, and thus a complete impediment is offered to the passage of the urine from this twofold source. Gonorrhœa is the common cause of retention of urine thus produced ; hence the treatment of the latter is properly involved in the consideration of that belonging to the former.

The great practical question which was at one time so strongly agitated as to whether, in case of retention of urine in connexion with acute urethritis, a catheter should be passed, or antiphlogistic measures alone adopted, is now pretty generally admitted to be settled. If the symptoms of retention are not urgent, if there is but little pain, and especially if fever is present, it is better to confine our measures to those of an antiphlogistic character, and to the administration of anodynes. If the patient is full and robust, blood may be taken from the arm with much advantage ; if not, it may be withdrawn from the perineum by leeches or cupping. The warm bath may then be employed, tartar emetic administered, and if this course do not succeed in relieving the retention, opium given by the mouth or rectum will in general soon cause relaxation of the spasm, and the urine to flow. But should the bladder be much distended, there being strong and frequent ineffectual efforts made to empty it, and considerable accompanying pain, the surgeon should never hesitate to pass a catheter ; the speedy withdrawal of the urine saves the individual from protracted suffering, and averts the mischief that may arise from repeated violent paroxysms of forcing and straining to unload the organ. A gum-elastic catheter of No. 4 or No. 5 size,

and without the stilet, is in general the best kind of instrument to employ ; when smooth and soft, warmed, and well oiled, and very gently passed into the bladder, it can hardly aggravate the urethral inflammation ; and if any increase of irritation were to result from the procedure, while it would doubtless prove of secondary importance, it would admit of being very readily removed by appropriate treatment.

But it is retention resulting from organic stricture that calls for special consideration. Here, as in the case of inflammatory stricture, the cause of complete closure of the canal is muscular contraction ; occlusion rarely if ever results from the organic obstruction itself ; the aperture may not be larger than a pin-hole, and yet the urine can escape in sufficient quantity to prevent complete retention. It is true that inflammation of the strictured spot, which often occurs, might lead in some instances to such a degree of closure of the tube as would effectually interrupt the flow of urine from the bladder ; but even in these cases spasm is superadded, so that it may be viewed as being in all cases of stricture instrumental in producing the retention of urine. It must be remembered that organic stricture is in the great majority of cases situated in or close to the membranous part of the urethra ; any irritation therefore excited in or about the strictured spot is readily propagated to Wilson's muscles, and they are thrown into spasmodic contraction. If at any period of stricture the individual expose himself to wet or cold, or undergo much fatigue, or indulge too freely in alcoholic liquids, a high degree of irritation

is apt to be excited in the stricture, which communicated to the surrounding muscles causes effective spasm. Thus it is that when "morbid sensibility" exists, the tendency to retention of urine is so much increased; for whenever the patient gets cold or wet feet, or exceeds in the allowance of his wine, the urethral irritation is sure to be greatly exalted, and this cannot fail to induce spasm. Hence the best means of averting frequent attacks of retention in these cases is by the individual adhering rigidly to an abstemious and simple regimen, and avoiding every kind of fatigue, and exposure to cold.

As soon as the bladder becomes distended in consequence of complete retention of urine, most painful, distressing, and urgent symptoms set in. There is constant desire to pass water, accompanied by violent forcing and straining; when, after repeated efforts, a few drops are expelled, this is attended with a sense of scalding along the urethra, and a peculiar painful sensation at the neck of the bladder. Pain is at the same time experienced across the loins and along the thighs; the skin is hot; the pulse quick, being either strong and full, or small and wiry; the tongue is furred; there are thirst, restlessness, and anxiety, and not unfrequently vomiting; in short, the ordinary symptoms of fever are present. Should the bladder remain long unrelieved, the fever changes, becoming of a low irritative character, and eventually, if death do not occur from exhaustion, the urine begins to flow away involuntarily; but this event, so far from proving of any advantage, is to be taken as evidence of excessive distention of the organ, and the more loudly

calls for surgical interference. If this be not promptly afforded, and the bladder be allowed to remain for any length of time so fully distended, the patient gradually sinks and dies, partly from pain, irritation, and low fever, but mainly from the impediment that exists to the action of the kidneys ; the urea, not being excreted, accumulates in the blood to such an extent as to poison it, and death results therefrom, at the end, ordinarily, of five or six days from the occurrence of the retention. In those cases in which there has been partial retention for some time previous to the complete stoppage, and that the distention of the bladder has been slow and gradual instead of sudden, fatal results are longer deferred. If the retention have existed for a certain number of hours, and owing to the short duration of the stricture, the bladder had not undergone any pathological changes, the organ will be found distended above the pubes, forming a circumscribed, fluctuating tumor in the hypogastrium, which can be distinctly felt with the hand; while, if the finger be introduced per rectum, the inferior fundus will be found bulging towards the gut. But if the bladder be thickened and its capacity diminished, a state in which it is almost invariably found after the stricture has existed for any considerable period, the organ will not admit of being distended to an extent capable of being felt above the pubes or even per rectum ; therefore the patient's distress and the general urgency of the case will often be as great from the presence of only a few ounces of urine, and after a few hours of retention, as will arise in other cases from a very large quantity of fluid,

and after the retention has lasted two or three days. Accordingly the necessity for prompt surgical interference in a case of retention of urine depends rather on the urgency of the symptoms and the general condition of the individual, than on the quantity of urine retained and the length of time the retention has lasted.

The means of relieving retention of urine have been divided into the mechanical and the remedial. The old practice of adopting the latter in the first instance, and not having recourse to the former unless the remedial means have completely failed, is no longer observed. Every practitioner is now convinced that a host of evils much more formidable than any mischief that can arise from the introduction of instruments results from allowing the patient to writhe in torture for several hours, whereby there is loss of contractile power in the bladder from its long-continued distension, and danger of rupture of the urethra followed by extravasation of urine in consequence of the forcible efforts to pass water.

The mechanical means may be carried out in two ways :—1st. by passing a catheter through the stricture into the bladder; 2nd. by pressing a bougie against the stricture, or partially introducing it through the obstruction.

When the surgeon is called to a case of retention of urine arising from stricture, his first object should be to introduce a catheter into the bladder, and thus relieve the overloaded organ at once. With this view he should select a gum-elastic catheter of No. 3 size, which he should endeavour to pass without a stilet. The patient

should be placed in the standing position, with his back supported by a straight wall, and the catheter being set as much as possible to the curve of the urethral canal, is to be slowly introduced and in a direction nearly parallel to the abdomen until it reaches the bulb. Both hands should be then depressed so as to bring the instrument almost at right angles to the body, the penis being well drawn out with the left hand, while the right gently and steadily presses the instrument towards the bladder. If the catheter do not enter the stricture at once, let it be withdrawn from it a short distance, and then pushed forward again ; this manœuvre may be repeated three or four times in succession, on each occasion its point being turned in some different direction, when at length the difficulty will be in general overcome, the instrument finding the aperture in the stricture, and passing on into the bladder. If we fail with No. 3 size, we may yet succeed with No. 2 or No. 1, or even the size under the latter. An objection may be urged against using very small instruments, on the ground that, owing to the tardiness with which the urine escapes through them, a long time necessarily elapses before the bladder can be sufficiently emptied to afford decisive relief. But the size of the instrument must be proportioned to the closeness of the stricture ; besides, in many cases, though the former be very small, after it has lain a few seconds in the urethra the spasm may be so much relaxed as to admit of the urine flowing out freely along the sides. Where small instruments are unavoidable there is none more likely to accomplish our

task than the "railroad catheter" of Mr. Hutton of Dublin. This contrivance consists of a long thin catgut string, which by delicate manipulation can in general be passed through very close strictures. Over it a small gum-elastic tube catheter is slipped, and when the latter is fairly lodged in the bladder, the catgut guide is withdrawn, the urine of course flowing through the tube, which, if it be deemed advisable, can be retained in the bladder. Very often, however, the surgeon is completely baffled in his effort to succeed with all the instruments alluded to. It may be that their small size renders them inefficient, in consequence of their wanting a sufficient degree of resistance, and their liability to catch in the lacunæ of the urethra. Accordingly, if he fails with these instruments, let him take one of No. 4, No. 5 or No. 6 size, which possess more resistance, adapt themselves better to the urethral canal, and are not likely to catch in the lacunæ. If he be foiled with the flexible catheter, he must resort to a curved solid one, either of silver or gum-elastic mounted on a firm stilet. The size to be selected will be regulated very much by the evidence furnished from the instruments previously employed, but as a general rule No. 6 or No. 7 is the size that will answer best. The gum-elastic is the preferable kind to employ, because, if there be much difficulty experienced in getting an instrument into the bladder, it becomes expedient to retain it there for several hours, and such a course is by no means so advisable with a metallic catheter, particularly one of small size. The metallic instrument is, however, much more likely to

prove successful in our hands, as it is steadier and more manageable than the gum-elastic. In employing such it is very important to attend to the directions given by Sir Benjamin Brodie, that they should be rather short with a gentle curve, and furnished with a wooden handle.

There is one point, however, connected with the use of metallic instruments in retention of urine, which can hardly be too strongly enforced,—the avoidance of violence. If the urethra be lacerated and blood drawn, or, less than this, if any injury whatsoever be done by the instrument, our chance of success is diminished ten-fold, for the spasm is increased. The catheter cannot be handled with too much gentleness and caution. Let the patient be placed on his back with the thighs drawn up, and let the instrument be slowly and gently introduced as far as the stricture. When the point rests steadily against it, he is to be kept there for some time, the pressure being gradually increased. Very constantly the spasm relaxes, the obstruction yields, and the instrument slips slowly into the bladder.

In a great majority of instances, however, the surgeon fails in passing a catheter, not from the closeness of the obstruction, but owing to the presence of a false-passage. A large number of cases of retention of urine, especially those brought to hospital, have been subjected to rough usage at the hands of unskilful catheterists, false-passage is established, and then every time an attempt is made to introduce an instrument into the bladder, it slips out of the canal, and passes on between the urethra, bladder,

and rectum, sometimes to such an extent that the instrument will be as much shortened as if it entered the bladder. The surgeon, seeing that the instrument has shortened nearly to the full extent, and still that no urine escapes, is apt to be deceived, and to conjecture that an impediment exists at the neck of the bladder ; and if, under this impression, he forces on the catheter, he must add to the mischief already done, and greatly aggravate the danger, since the false-passage is extended towards the cul-de-sac of peritoneum, any violence to which is followed by fatal results. Hence, whenever there has been much urethral hemorrhage, the existence of false-passage to some extent may be conjectured, and it becomes necessary to observe great caution in the further manipulatory steps. But surmise is changed to certainty if the instrument be observed to assume a twist in the canal, and especially if it be felt thinly separated from the finger introduced per rectum.

Again, even though the instrument have shortened to the full extent, the surgeon ought to know whether it be in the bladder or not. If a catheter be fairly in the bladder, the handle can be brought down between the patient's knees, or nearly so ; and even should this be prevented owing to the firm grasp exercised by the stricture, the point can be moved laterally without a feeling of resistance being communicated. But if it lie outside the organ, these movements cannot be made, and the resistance given at the point in the attempt to effect them cannot fail to be recognised where the proper tactile sensibility exists.

Now, whenever it is clearly ascertained that a false-passage exists, we must adopt the general procedure already described in the chapter on the treatment of stricture, and which it is unnecessary to recapitulate. But it too often happens that, quite independently of false-passage, our best directed efforts at catheterism fail, and we must then resort to the second instrumental method alluded to for relieving retention of urine. Let the surgeon take a No. 8 gum-elastic bougie, and passing it down quickly to the stricture, press firmly against it for a few seconds. The patient is then to make a forcible effort to pass water, when, on suddenly withdrawing the instrument, the urine will often follow—if not the entire contents of the bladder, as much at least as will relieve the urgency. The pressure against the stricture causes relaxation of the spasm, by (to use Sir Benjamin Brodie's phrase) "exhausting the morbid irritability of the diseased parts of the urethra." The chance of our succeeding with this plan is considerable, if no violence had been previously done to the urethra with instruments; and indeed in retention occurring suddenly, and where it is obviously due altogether or in chief part to spasm (as from the effects of intoxication) we may in the first instance adopt the procedure alluded to before any other measure is put into requisition. Very often, however, the large bougie fails, and then the surgeon frequently gains his object by passing one of smaller size partially into the stricture. That of No. 4 size with conical point can often be introduced a short distance, but the instrument best adapted for the purpose is the catgut

bougie. No instrument admits of being passed into a stricture with greater certainty, and it possesses the peculiar advantage of becoming enlarged if allowed to lie in the canal for a short time, and thus an impression is made which rarely fails to "exhaust the morbid irritability" of the stricture : as the bougie is withdrawn, the urine will in general follow.

Frequently, however, instrumental means endeavoured to be carried out in both the ways described signally fail : it then comes to be a question how we are to act. It is undoubtedly imprudent to persevere too much with instruments, as the case is aggravated thereby ; the penis, from the irritation caused by their continual introduction and withdrawal, becomes engorged, being often thrown into a state of semi-erection. The lining membrane of the urethra is thus rendered so congested, that it is impossible to avoid the production of some bleeding, and this occurrence surely defeats success. Accordingly, if after giving the patient a fair trial of the means best calculated to relieve the distended bladder speedily and decisively, we fail in our object, it is far better to desist from the use of instruments, and turn to the second method of relief,—the adoption of antiphlogistic measures and anodynes. These consist in bleeding, the warm bath, the administration of tartar emetic, of muriated tincture of iron, of opium, and the tobacco enema.

Many practitioners recommend bleeding, but it is rarely admissible. In the case of a strong phlethoric young man, suddenly seized with retention of urine, particularly if it be induced by wet or cold, a copious bleeding from

the arm will often cause relaxation of spasm and thus relieve the retention of urine ; and it may even be advisable to adopt this measure before employing an instrument. It must be remembered, however, that by far the majority of cases met with are those of persons broken down more or less in health, some being greatly prostrated from the effects of the retention, and many considerably advanced in life, under which circumstances to bleed would be most unjustifiable. Local bleeding, however, by means of leeches to the perineum, especially cupping if skilfully performed, is of great use where there is much fulness of that part and the case admits of some delay. The warm bath is a valuable remedy, and few cases of retention occur in which it does not become necessary to employ it at some period ; it is often effectual *per se*, but more frequently as an auxiliary. Owing to the consent that exists between the action of the bladder and rectum, it often happens that retention of urine is suddenly relieved by the bowels being vigorously acted on ; hence purgatives have been recommended ; but these agents are too slow in action to admit of their being used in the generality of cases. A strong enema, however, will sometimes quickly give relief in retention of urine by causing relaxation of spasm, and is frequently one of the best measures that can be adopted in the first instance, where retention arises from over-indulgence in alcoholic drinks. When the patient is strong and the spasm considerable, nauseating doses of tartar emetic will frequently afford speedy relief ; or, what has a similar effect, the muriated tincture of iron. This medicine, given in fifteen-drop

doses every fifteen minutes, causes nausea and depression of the system, during which the spasm is apt to relax and the urine to flow. The tobacco enema has also a powerful effect in overcoming retention of urine, but as its action necessarily creates excessive prostration, it is rarely admissible. Chloroform, by inhalation, has been administered on the ground of its peculiar power of causing muscular relaxation ; but its employment is often objectionable when the bladder is much distended, owing to the violent movements of the body and the general spastic condition which attend the first stage of its effects. When given internally in the fluid form, it does not seem capable of producing any very decided effect.

But of all the remedial agents opium is undoubtedly the most efficient ; and, as a general rule, the surgeon will do well to resort to it immediately upon the failure of catheterism. An enema containing half a drachm or a drachm of laudanum, or thirty or forty drops in the form of draught may be administered; and if this be not soon followed by the discharge of some urine, another enema of less strength should be given, or, what is better, the medicine by the mouth in smaller doses every hour. The following mixture I have found very useful where it is necessary to follow up the first enema or draught :—

R. *Misturæ Camphoræ*, fʒviiss.

Liquoris Anodynæ (*Hoffmani*), fʒiss.

Liquoris Opii. (*Battleyi*), fʒj.—*Two tablespoonfuls to be taken every hour or every second hour according to the urgency of the case.*

Sir Benjamin Brodie, in speaking of opium in reten-

tion of urine arising from stricture, says, "according to my experience, the cases in which stricture does not become relaxed under the use of opium, if administered freely, are very rare." The great advantages arising from the use of this drug are, that it relieves pain, calms the patient, and arrests the constant paroxysms to pass water, which latter constitute the most distressing if not dangerous accompaniment of the retention. In general, as the opium begins to exercise its specific action on the system, the patient is enabled to pass some water, at first only a little, but after a short time in a fuller and more copious stream.

From the foregoing observations we draw the following conclusions, subject of course to variation according to peculiarity of case, contingency, &c.

1st. That where the bladder is much distended, and there is severe pain and frequent straining to pass water, the primary course to be adopted is to attempt to introduce a catheter through the stricture into the bladder, and thus to unload the organ ; for which purpose one of gum-elastic without a stilet, varying in size from No. 3 to No. 5, is most applicable and likely to prove efficient, or the " railroad catheter" of Mr. Hutton ; and that, in the event of failure with these, a silver catheter from No. 4 to No. 7 size should be resorted to.

2nd. That where the stricture proves impenetrable, we may nevertheless succeed, if not in emptying the bladder, in relieving the urgency of the case by the pressure of a bougie against the obstruction, and par-

ticularly by introducing the point of a catgut bougie into it, and leaving it there for some minutes.

3rd. That where the bladder is not much distended, and the general symptoms of retention are not very urgent, it is preferable in the first instance to adopt some of the remedial measures, especially in cases where the stricture is incipient, and there is reason to believe the obstruction is mainly due to spasm. When the patient is young, strong and plethoric, venesection is often the most suitable ; or, where there is any degree of urethral inflammation, local bleeding followed by the warm bath, tartar emetic, or the muriated tincture of iron, will sometimes better meet the requirements of the case. The remedial agent, however, on which we are chiefly to rely is opium, which, if administered freely, rarely fails.

But unfortunately it too often happens that the case is proof against the entire array of mechanical and remedial means which have been detailed. The aperture in the stricture may be so close as to render it physically impossible to introduce any kind of instrument, or the co-existence of false-passage may also utterly defeat our efforts. Again, the spasm may be so powerful as to disregard the impression that the contact of an instrument can make, or the influence of any antiphlogistic or sedative agents exercise. The bladder is now fully distended, the dangers are fast thickening around the patient, and his life is in imminent peril. Under such circumstances the surgeon can only resort to one of three expedients, viz. to force the stricture; to cut down in

the perineum, open the urethra behind the stricture, and thus gain access to the bladder ; or to puncture the organ itself. Indeed it frequently happens that one of these expedients must be resorted to immediately on the failure of the first efforts at ordinary catheterism, for if the symptoms be urgent, the delay necessarily attendant on carrying out the other methods may lead to fatal results.

The practice of forcing stricture has been condemned by some surgeons, and not without a good show of reason ; certainly the correct way to view it is as an alternative, the successful carrying out of which saves resort to more formidable methods and greater hazard. In treating stricture with the object of effecting its slow absorption, too much gentleness cannot, as has been already strongly urged, be observed in the use of instruments ; but the case is different in retention of urine ; here the paramount object is to relieve the distended bladder, and any violence done to the stricture itself weighs comparatively light in the balance. The risk does not result from the successful accomplishment of the method alluded to, but from its failure, in consequence of the wrong mode in which it is attempted to be carried out. Hence it is evident that no surgeon but one who is a practised catheterist, who has an accurate knowledge of the anatomical arrangement of the urethra, and possesses steadiness and full confidence in himself, should attempt to force a stricture. It becomes obvious that where much force is demanded, if the instruments be not properly handled, the urethra must be lacerated, hemorrhage produced, and extensive false-passage made ; and false

passage not only defeats present success, but also very greatly diminishes the chance of effecting the cure of the stricture at a future period. The proper instrument to employ for the purpose of forcing stricture is a metallic catheter of conical shape. The size should not be below No. 6, since it must possess sufficient strength to admit of a considerable degree of weight being leaned upon it, and the point must be somewhat rounded off, for if sharp it is sure to catch in the lacunæ and lacerate the lining membrane. The instrument being introduced along the urethra, the situation of the stricture is to be sought ; for which purpose the catheter must be handled with the greatest lightness and delicacy, no pressure being made until it is ascertained that the point rests fairly against the obstruction. The catheter is then to be steadily and firmly pressed against the stricture, the force being gradually augmented. The great object to be held in view is to keep the point against the face of the stricture, for it is obvious that if it come to bear on the lining membrane in front of the obstruction, the force employed will generally be sufficient to send the instrument completely out of the canal, and make it take a course between the urethra, bladder, and rectum. And it may easily be conceived how readily this catastrophe, which has often happened, can occur. The patient writhes his body from the excessive pain, and cries out imploringly for instant relief ; the surgeon becomes anxious and loses his self-command, and in this dilemma the instrument is apt to slip unobserved from the proper direction. To prevent this occurrence, the point of the instrument

should be directed somewhat towards the upper aspect of the urethral canal ; for which purpose, while the right hand holds the catheter and pushes it on towards the bladder, the fingers of the left should be firmly placed on the perineum, by which the point is steadily maintained against the stricture, and the chance of its slipping down on the floor of the canal is obviated. It is surprising how a stricture even of the most dense and unyielding nature will give way under pressure thus steadily, gradually, and patiently exercised. Once ever so small a portion of the point of the instrument has entered the obstruction, we may force to the full extent, for then the instrument is steadily fixed in the proper position, and there is little risk of mischief being done by a dexterous catheterist.

But the attempt to force through a stricture often fails, and the next best step is to open the urethra through the perineum, for thus we may be able at the same time to divide the stricture. This operation, however, (the steps of which have been described in the last chapter,) though difficult and objectionable under any circumstances for the reasons already assigned, becomes doubly so where the perineum is deep, or, yet more, when the urethra is pushed from the mesial line, or otherwise altered from the proper course. Under such conditions the operation may occupy a great length of time in the performance, or fail altogether. Again, if, in making the incision in the urethra, the bulb or its artery be wounded, very formidable and often ungovernable hemorrhage is

produced. Lastly, the existence of false passage may render it quite impossible to perform this operation.

But it sometimes happens that the urethra behind the stricture is dilated, and then the operation through the perineum is comparatively easy. Indeed if the dilatation be considerable, and there be much strain upon it from the action of the bladder, the simplest proceeding in such case is to puncture the urethra and thus allow the urine to escape; the patient is thereby saved all the delay and suffering consequent on the endeavours to unload the bladder by the other means, and afterwards attention can be directed to the stricture. This plan was particularly advocated and adopted by my father; the following extract from one of his lectures bears on the point :—"This," he says, alluding to the dilatation the urethral canal undergoes, "is a valuable practical fact, for we are often enabled to give relief in retention of urine by opening the dilated urethra, which does away with the necessity of performing that serious operation,—tapping the bladder. Some years ago a patient in Steevens' Hospital under the care of Mr. Cusack was seized with retention of urine as the result of a stricture of long standing. On examining the perineum a swelling presented itself behind the scrotum, about the size of the human gall-bladder. It was oblong, not pyriform, and it yielded distinct fluctuation. Mr. Cusack plunged a lancet into it, and urine flowed out freely, and, if I mistake not, he passed a gum-elastic catheter into the bladder through the opening made in the perineum, and drew off some urine that remained."

The third expedient is the last but an unfailing resource,—paracentesis vesicæ, of which there are three methods, viz :—puncture from the perineum ; through the rectum ; or above the pubes. Sir B. Brodie makes the following remarks regarding the eligibility of these operations:—“ You may prefer one operation to the other ; but you will not be able in practice to resort to one exclusively. Your choice must be influenced by the particular circumstances of each individual case. If the patient be thin, and the bladder be much distended, you may puncture it above the pubes ; but if the patient be corpulent, this operation will be difficult ; and if the bladder be contracted, it will be impracticable. If the bladder be much distended and the prostate gland be of its natural size, you may puncture it from the rectum ; but if the distension of the bladder be inconsiderable, or the prostate gland be enlarged, this operation will be at the same time difficult and dangerous. The puncture of the bladder from the perineum is so serious and severe an operation, and attended with so great a chance of mischief from the effusion of urine into the loose cellular texture; that no surgeon of the present day, as far as I know, ventures to recommend it.” He sums up his remarks with the following observation:—“ On the whole, from what experience I have had on the subject, I am inclined to believe that the puncture of the bladder from the rectum is applicable to a greater number of cases than any other operation.” It is true the operation by the rectum is very simple, and may in many cases be expeditiously performed, and it possesses the great advan-

tage of appearing less formidable to the patient than the two others. The index finger of the left hand being introduced into the rectum, the point is to be carried fairly above the prostate gland, and made to rest as near as possible in the centre of the triangular space on the inferior region of the bladder. A curved trocar and canula, about seven or eight inches in length, is to be next passed along the anterior aspect of the finger, care being taken to keep the point of the perforator a short distance within the silver tube ; when the latter arrives at the extremity of the finger, it is to be drawn back so as to uncover the point of the perforator. The instrument is then plunged into the bladder. The canula is to be retained *in situ* with appropriate tapes until the urethra be re-established.

In Dublin, surgeons have for a long time observed the practice of tapping the bladder above the pubes in preference to operating per rectum, and undoubtedly many arguments can be advanced in support of this operation. It can be performed with as much speed as the other, certainly with more precision, and is perfectly free from risk, if ordinary care be taken ; whereas in puncture by the rectum a number of important parts may be injured, even the cul-de-sac of the peritoneum, should the surgeon recklessly plunge the trocar too far backwards. Again, the presence of the canula in the rectum is a source of great annoyance to the patient, it being often necessary to have it withdrawn before any impression can be made on the urethral obstruction ; but in the case of the supra-pubic puncture the opening made in the

bladder may be indefinitely maintained. From these considerations it appears that tapping the bladder above the pubes is the operation most generally suitable to cases of retention of urine resulting from stricture. I have seen it frequently performed without its being followed by untoward results ; yet it is proper to be governed by Sir Benjamin Brodie's remark, that we ought not to bind ourselves to either exclusively.

The mode of performing the supra-pubic operation is as follows :—The patient is to be placed on a table, and so settled that his feet can be supported on a chair or stool. The hair covering the pubes having been shaved off, an incision varying from an inch and a half to two inches in length is to be made directly in the mesial line, and commencing close to the symphysis. This incision is to be carried through the skin and superficial fascia. Another is then made through the linea alba, to an extent sufficient to admit the index finger of the left hand, which is to be passed into the bottom of the wound. The symphysis of the pubes is to be felt for, and immediately above it is the spot where the bladder is uncovered by peritoneum, and through which accordingly the trocar is to be plunged. When the point of the finger has discovered the exact spot, a large straight trocar and canula similar to that ordinarily used in paracentesis abdominis is to be glided along the finger, and then plunged into the bladder in a direction obliquely backwards and downwards. The instant the perforator is withdrawn, the finger is to be quickly applied to the canula in order to restrain the sudden gush of urine,

until a gum-elastic catheter, which it has been previously ascertained passes freely through the canula, is in readiness for introduction. Some surgeons remove the canula immediately upon the catheter being lodged in the bladder, but I think it better and safer to allow the canula also to remain in for twenty-four or thirty-six hours, at the end of which time the adhesive process will have obliterated the areolar tissue about the incision, and there is no fear of any urine which may escape along the sides of the catheter being infiltrated. As the catheter passes through the canula it cannot fill up the opening in the bladder, and therefore no security exists against extravasation. After the lapse of three or four days, should the stricture prove still impenetrable the catheter must be changed ; but care must be taken not to withdraw it until a probe or director has been first passed into the bladder, in order to serve as a guide to the fresh instrument. Disregard of this simple proceeding may lead to much trouble and difficulty, for in general it happens that the opening in the bladder and the incision in the abdominal parietes do not correspond, or that a considerable interval lies between the two, so that it may be impossible to get a catheter fairly through. After the lapse of some time the passage becomes more direct, and then an instrument may be often readily passed without any guide ; but on the first few occasions it is prudent to observe the precaution alluded to, and thus guard against failure.

I was once present at a post mortem examination of a case in which the bladder had been tapped above the

pubes twenty-five years before death, and instead of the organ lying close to the abdominal parietes at the seat of the old incision (which was completely obliterated) it was connected by means of a thick broad membrane fully half an inch in length.

Should it happen (as is sometimes the case, owing to the extreme obstinacy of the stricture, the presence of a false-passage, or of some impediment at the neck of the bladder such as would be furnished by enlargement of the prostate gland) that the urethral channel for the urine cannot be re-established, the individual may live for many years with the artificial opening above the pubes, and with very little inconvenience arising from it, if a properly devised apparatus be used. In the following instances the bladder was tapped above the pubes, owing to the existence of false-passage which defeated all efforts at catheterism ; in two of the cases an attempt was made to open the urethra through the perineum, which failed.

B. H., aged forty years, of very intemperate habits, has been subject to difficult micturition for twelve years, during the last five of which the urine has been expelled in a thread-like stream. Having indulged with more than usual freedom in intoxicating drink, he was seized with retention of urine. He was brought into hospital in a state of great suffering, the symptoms of retention being very urgent. The bladder was greatly distended, and his body was bent forward, which attitude he instinctively assumed to remove the pressure of the abdominal muscles from the bladder ; and besides the distress arising

from the distention of the organ, and the constant paroxysms to expel the urine, he complained of severe pain across the loins and down the thighs. After several ineffectual efforts to pass a catheter, the progress of which was arrested at the bulb, an attempt was made to open the urethra through the perineum. This operative step, however, failed ; owing, as it was ascertained, to the presence of a false-passage immediately at the bulb, into which the staff slipped. Delay could no longer be allowed ; the bladder was accordingly tapped above the pubes, before the patient was removed from the table. The operation succeeded perfectly, and though considerable difficulty was experienced in overcoming the stricture, owing to the false-passage lying in front of it, the urethra was perfectly re-established, and the opening above the pubes healed in four weeks after the operation.

T. G., aged fifty, was brought to Steevens' Hospital, suffering from retention of urine. He stated that he had laboured under stricture for nearly twenty years, during which period he had been constantly seized with retention, but that this was the only occasion on which the attack resisted ordinary methods. Previously to admission he had undergone several attempts at catheterism by more than one surgeon, and from the urethral bleeding and other evidences it was obvious that false-passage had been made. After his admission efforts to pass a catheter were renewed, but as they proved unsuccessful it was determined, notwithstanding the presence of the false passage, to endeavour to relieve the bladder by opening the urethra through the perineum. It was

thought that by using a large staff, and keeping its point well towards the upper wall of the urethra, the false passage might be avoided and the stricture divided. The effort was made but failed, and the operation was attended with considerable hemorrhage. The bladder was then tapped above the pubes, and the result was quite satisfactory. Owing, however, to the great difficulty of getting through the stricture, partly from its extreme closeness, and partly from the false passage, the opening above the pubes was necessarily maintained for a long time.

B. H., aged thirty-seven years, was seized with retention of urine arising from stricture which had never been subjected to treatment. The symptoms came on slowly, and two days had elapsed before his admission into hospital. Catheterism failed completely, and as the case admitted of no delay it was deemed advisable to tap the bladder; this operation being selected in preference to that of opening the urethra through the perineum, owing to the presence of an extensive false-passage and the thickening of structures in the perineum, which resulted in all probability from the repeated use of instruments during the two previous days. The supra-pubic operation was accordingly performed. No attempt was made to treat the stricture for a period of five weeks, in consequence of the enfeebled state of the patient's health; but at the end of that time the use of instruments was commenced, and after many fruitless endeavours which occupied several days a French conical bougie was passed fairly through the stricture, and left in for a few hours.

On its withdrawal a No. 2 gum-elastic catheter was readily introduced, and it was tied in the bladder. Every third or fourth day the catheter was removed, and a fresh one a size larger introduced until No. 12 size was attained. The opening above the pubes closed completely in two or three days after the instrument that lay in the bladder was removed.

CHAPTER VIII.

ABSCCESS IN PERINEO AND URINARY FISTULA.—Difficulty of detecting matter in the perineum.—Two varieties of perineal abscess—Simple or sympathetic form.—True urinary abscess, circumscribed and diffused.—Sloughy urinary abscess.—Abscesses connected with the bladder.—Treatment of perineal abscesses.—Urinary fistula.—Fistula from fractured ramus of the pubes.—Complication of fistula with urethral calculus.—Treatment.

ABSCCESS in the perineum is another common and formidable event that may arise at any period (though more usually in the advanced stages) of stricture of the urethra. If a patient the subject of stricture, especially after being exposed to wet or cold, or indulging too freely in wine or spirits, should complain that all the urinary symptoms are augmented—the difficulty, frequency, and scalding in passing urine—and that there be tenderness on pressure along the perineum, we have strong grounds, even should there be no marked swelling, for apprehending that an abscess is about to form in that situation, and it will be always a wise precaution to adopt prompt measures for the arrest of the incipient suppurative action. If the case be neglected or mismanaged, tumefaction occurs, and sooner or later suppuration follows. To recognise when matter has formed in the

perineum is most important, and still we are in general denied the most satisfactory and conclusive means of ascertaining its presence :—the sense of fluctuation. There is so much surrounding œdema and so much thickening of the areolar tissue from deposit of lymph, that to feel fluctuation, with so small a scope in general for eliciting it, is often impossible ; and this difficulty is further increased when the matter lies beneath the deep perineal fascia. Our knowledge, therefore, that suppuration has taken place is mainly grounded on conjecture ; however, if there be decided tumefaction, with tenderness on pressure, pain, and increased difficulty in micturition, and if we learn that a rigor has occurred, even though the skin is not yet discoloured and there is no very marked constitutional disturbance, we may entertain but little doubt that an abscess exists. Sometimes an indication is present which is as certain an informant of the presence of matter as fluctuation, namely, the sensation of there being a soft doughy spot into which the finger sinks on firm pressure ; and this guide is particularly valuable when the suppuration has taken place beneath the deep fascia. Let the fingers, held closely together, be passed along the perineum, making firm pressure, and if one of them should convey the sensation of having sunk into a soft spot, we may consider this, particularly if there be redness of the skin, as conclusive evidence of the presence of matter. When the abscess lies superficial to the fascia and is extensive, then fluctuation is often to be felt. Such abscesses are not always confined to that part of the perineum which lies between the anus and

scrotum ; they very frequently occupy the entire of the perineal region, extending above the scrotum as far as the pubes. When they take this course, the tumefaction is very great, the whole perineum being thickened and bulged out to such an extent as often to admit of its being grasped. The root of the penis appears pushed out, and the scrotum is greatly swollen, red, and glossy, its rugæ being obliterated ; if in such cases the root of the penis be grasped with the fingers of one hand, and those of the other be placed on the centre of the perineum below the scrotum, and that alternate pressure be then made, fluctuation is often felt satisfactorily.

Perineal abscess presents two varieties, which it is necessary to discriminate not merely as a matter of pathological interest, but of the highest practical importance, viz. the simple or sympathetic and the true urinary abscess. The sympathetic abscess results from irritation within the urethra being propagated to the areolar tissue outside the canal. It has been already observed more than once, that in some cases a high degree of irritation exists in the vicinity of the stricture, which from various causes, such as the effects of cold or wet, or the over-use of spirits, or roughness in passing a bougie, is apt to be exalted into inflammation ; and if this be communicated to the areolar tissue around the urethra, suppuration almost inevitably follows. Abscesses thus formed may be acute, subacute, or chronic. In the acute, the premonitory symptoms are always of short duration. The patient is seized with a rigor, and fever which partakes of the sthenic character sets in ; at the same time

pain is felt in the perineum, and on examination a swelling is discovered there ; it is usually of an oblong shape and firm, and the skin covering it is undiscoloured. Quickly, however, another rigor follows ; the skin becomes red at one spot, and these two occurrences indicate that matter has formed, and now all the symptoms are increased in urgency, the fever often runs high and is changed more or less in character ; the pulse becoming quick, small, and feeble, the tongue dry and furred, there are complete loss of appetite and considerable debility : if the abscess be deep-seated, it is apt to cause retention of urine from its pressure on the urethra.

The subacute form of abscess is more common ; the swelling in the perineum may remain in an indolent state for a couple of weeks or longer, giving rise to very little distress or inconvenience ; and when suppuration occurs, it is limited, and attended with but slight constitutional disturbance. The chronic sympathetic perineal abscess is comparatively of slight importance. A swelling slowly arises in some part of the perineum, usually between the anus and scrotum ; it is devoid of pain, the skin covering it is of the natural colour, and there is no appreciable disturbance of the system in any respect ; the case may thus remain for several weeks. If the patient be properly attended to at first, being made to observe the horizontal posture, and use mercurial friction to the swelling, it may be dispersed ; if not, suppuration gradually occurs, the skin slowly becomes red at one spot, and a small collection of matter forms.

A perineal abscess purely sympathetic does not of

course communicate primarily with the urethra ; hence the sac contains no urine ; still the pus is usually foetid ; when, however, such abscess is deep-seated it is apt if neglected to burst into the canal, and thus a communication is established ; and in any case, in the course of two or three days after it is opened, or it bursts externally, urine generally trickles through the opening, and a fistula is left. The following case is an example of a large acute sympathetic abscess in which the pus was perfectly free from foetor, and which closed up without terminating in urinary fistula, though a tight stricture existed.

Mr. B. aged forty-five years, of full habit and accustomed to live freely, had several attacks of gonorrhœa which terminated in a very tight stricture. While under treatment for the latter he was seized with a violent rigor, and this was followed by a succession of slighter rigors which led him to believe that he had been attacked with common ague. I did not see the case for more than a week after the appearance of the first symptoms. I found an enormous swelling occupying the whole perineum, the scrotum was greatly swollen, red, and shining, and the root of the penis was considerably pushed out. There were great difficulty and pain in passing water, low fever, profuse sweating, and much debility. By grasping the root of the penis with the fingers of one hand, placing those of the other in the middle of the perineum below the scrotum, and pressing alternately, fluctuation was satisfactorily elicited. A free incision was immediately made in the mesial line of the perineum, extending from the root of the scrotum close to the anus, and

vent given to a very large quantity of light coloured pus which was perfectly free from any foetor. In the course of two or three days the abscess had nearly subsided, but there did not pass any urine through the opening, as is usually the case, and long before impression could be made on the stricture, the sac had completely closed and no trace of a fistula remained.

The true urinary abscess is much more formidable than the sympathetic, being of serious import not merely from the degree and the nature of the fever which in general accompanies it, but also from the risk that infiltration of urine may occur. This sort of abscess has its origin in ulceration of the urethra behind the stricture. We have seen that in tight strictures of long standing the urethra usually becomes dilated immediately behind the obstruction, and the pouch so formed undergoes various morbid changes, especially ulceration. If the ulceration should perforate to a depth sufficient to allow the escape of only a few drops of urine into the areolar tissue, suppuration is excited, and the sac of the abscess will communicate with the urethra, and contain urine as well as pus. These abscesses are circumscribed and diffused. In the former case, the swelling is small and well-defined, it yields distinct fluctuation, and where, owing to the closeness of the stricture, much impediment exists to the expulsion of the urine, the sac bulges out and becomes tense to an extent that can be often felt and seen. When the stricture is tight, and the opening between the urethra and abscess is large and direct, the urine finds a ready entrance into the sac, and during the forcing to

pass water so much tension is exercised on its parietes they are apt to be ruptured, and the urine is then extravasated into the areolar tissue of the perineum, scrotum, and penis ; which event is very likely to occur, seeing that the cyst is usually thin, and the expulsive power of the bladder much augmented from hypertrophy of its muscular fibres. The abscess may be situated in any part of the perineum between the anus and scrotum, opposite to the scrotum, at the root of the penis, or even anterior to this point.

The diffused abscess is the result of a much more extensive extravasation of urine than the circumscribed ; it is often very large, and makes its way to a distant part ; the cyst is in general imperfectly developed. When it occupies the entire perineum as far as the root of the penis, the tumefaction is very great, the scrotum is red and oedematous, and frequently broad red lines, which indicate some extravasation of urine in that direction, are observable in the groins, taking the course of the spermatic cord on each side. Sometimes, however, these abscesses wander considerably beyond the perineal region, and will appear above the pubes, in the groin, half-way down the thigh, or pass backwards and outwards and point on the nates. Sir Benjamin Brodie says : " In one case, in which I had the opportunity of examining the body after death, I found a large abscess in front of the pubis, extending half-way towards the navel ; another among the abductor muscles of the left thigh ; and a third among the muscles at the upper part of the right thigh, as far outwards as the foramen ovale of the

ischium ; the periosteum having been destroyed, and the bone itself render carious to a considerable extent ; and all these abscesses could be traced into an abscess in the perineum, communicating with the urethra behind a stricture by a small orifice."

Occasionally the abscess will turn towards the rectum and burst into it, thus giving rise to a very disagreeable and troublesome form of urinary fistula. In this case we can only conjecture the establishment of a urethro-rectal fistula, from the fact that a little urine passes by the rectum, and air sometimes through the urethra ; fæces seldom escape through the same channel, as the opening into the gut is usually too small and indirect. After a short time an external opening is in general formed in the perineum near the anus, by which the fistula becomes complete both as regards the rectum and the urethra, the outer orifice being common to the two fistulous passages. Under such circumstances, unless the surgeon learns the previous history of the case, he is apt to mistake its nature at first, and to view the fistula as one entirely connected with the rectum, instead of being primarily dependant on urethral obstruction.

Urinary abscesses, like the sympathetic, are acute, subacute, and chronic. The acute abscess is very formidable. After experiencing some increase of difficulty, and some scalding sensation in passing water for a day or two, the patient is seized with a rigor often of unusual severity, which is occasionally followed by vomiting. A swelling rapidly forms in the perineum ; it is intensely painful, the skin covering it quickly becomes red, and

fluctuation is soon perceptible. If it be well-circumscribed, by placing the hand upon it as the individual forces to pass water, it will be observed to enlarge and become tense ; this change is not so conspicuous when the abscess is diffused. Should there be delay in giving vent to the pus and urine confined in the sac, the abscess will enlarge and the fever augment ; but the latter, instead of retaining its inflammatory character, merges into a low typhoid type much greater than is observed in the sympathetic form of abscess, and which bears a proportion to the extent of the purulent collection, and in great measure to the extent of the urinary infiltration. Hence the diffused abscess is more formidable than the circumscribed, not only on local grounds but on account of the accompanying fever.

The chronic urinary abscess may remain stationary for a long time, giving rise to so little pain or inconvenience that the individual would often be unaware of its existence, if it were not for the effect usually observed during the expulsion of the urine. When pressure is made upon the abscess, if the communication between it and the urethra be free and direct, pus is driven into the canal, and the sac partially collapses. After a long time has elapsed the skin becomes red, and if the abscess be not opened it bursts, giving exit to pus and urine, and then degenerates into a fistula. During its entire course there is no fever, nor the least constitutional disturbance. Sometimes these abscesses are of very small size, and communicate with the urethra by a narrow indirect channel ; hence the urine cannot readily enter the cavity.

It is therefore comparatively flaccid ; but when the pus collects to such an extent as to distend the sac, it empties itself into the urethra. Thus it may go on for a long time without showing any disposition to point externally. Sir Benjamin Brodie has aptly compared this kind of urinary abscess to "the blind fistula of the rectum." Sometimes urinary abscesses hold a middle position between the two extreme states just described, not being sufficiently active to deserve the title of acute, nor yet so passive as to admit of being classed under the head of chronic ; such are subacute in their character, and while they do not demand prompt and energetic measures to the same extent as the very acute, they are worthy of far more concern than the chronic, since they cause considerable pain and inconvenience, often some constitutional disturbance, and endanger the occurrence of extravasation of urine if the stricture be tight.

The foregoing are examples of the ordinary perineal abscesses met with in practice. Occasionally, in broken-down constitutions, such abscesses assume a sloughy condition, and are attended with much debility, as exemplified in the following case.

Michael Mc Donough, aged sixty-six, was admitted a few years ago into Steevens' Hospital. He was much emaciated, and in a very low feeble state ; pulse small, quick, and weak ; tongue dry and brown. It was impossible to acquire any information of the case from the patient, except that he had for several years laboured under stricture of the urethra, and that latterly his health became greatly enfeebled. On examining the perineum

there was found a tumour about the size of a turkey's egg, extending from the root of the scrotum to the anus; it yielded a soft boggy feel, and presented a brown, gangrenous appearance. An incision was immediately made into it, and exit was thus given to some dark coloured foetid pus mixed with urine; the latter, however, was not extravasated beyond the limits of the tumour. The urethra was then explored, and a tight stricture was discovered about the bulb. The patient was ordered wine and bark, and a fermenting poultice was directed to be applied to the perineum. In a few days the sloughs were detached, and on examining the part, the urethra was found to be laid bare for the entire extent of the original tumour, and a fistulous opening leading into the canal was distinctly visible. It was considered that the best plan under such circumstances would be to divide the stricture with a knife from without, and to carry on the incision through the fistula; the patient's low, feeble state, however, forbade the operation being carried into effect. He gradually sank, and died at the end of about a week from the date of his admission into hospital.

The urinary abscesses which have been under consideration are those that are connected with the urethra, having their origin in ulceration of the dilated part behind the stricture. But collections of matter having connexion with the bladder exclusively, and originating according to Sir Benjamin Brodie's opinion in ulceration of its parietes, and the consequent escape of urine into the areolar tissue outside, are occasionally met with in cases of old strictures which have been much neglected or mismanaged

Such abscesses may present themselves above the pubes, and when in this situation, if of large size, it can be well imagined how readily the surgeon may be deceived, fancying that the supra-pubic tumour is a distended bladder, especially in a case where retention of urine partial or complete exists. The following case, in which complete retention of urine co-existed with an abscess above the pubes, has been mentioned to me by Mr. Cusack. In it the collection of matter held no communication with the bladder ; still it is strongly illustrative of the important practical point to which allusion has been just made.

Many years ago a man was brought into hospital who complained that he had not passed a drop of urine for upwards of thirty-six hours, and on examining the hypogastric region, a circumscribed tumour bearing all the characters of a distended bladder was felt above the pubes. A catheter was immediately introduced into the urethra, but an impenetrable stricture occupying the ordinary situation prevented the advance of the instrument into the bladder. As the patient's distress was very great and the symptoms urgent, it was deemed imprudent to lose any time at catheterism ; accordingly steps were immediately taken for relieving the retention of urine by means of the supra-pubic operation. As soon as the trocar was plunged into the tumour, a copious flow of pus followed ; it presented the ordinary appearance, there was no foetor, nor any admixture of urine. The nature of the case was now obvious ; the circumscribed tumour felt above the pubes was an abscess lying behind the abdominal parietes and in front of the bladder, which by its

pressure on that organ interfered with the expulsion of the urine. Under ordinary circumstances the presence of an abscess in this situation should be viewed merely as an incidental circumstance ; but seeing that a tight stricture existed, the presumption was in favour of the collection of matter being the result of irritation propagated from the lining membrane of the bladder to the areolar tissue outside of it, precisely similar to the sympathetic abscess of the urethra already described. Hence it would appear that there are sympathetic and true urinary abscesses of the bladder as well as of the urethra.

Early and free incision is the undeviating rule to be observed in the treatment of all perineal abscesses. The true urinary abscess, especially of the acute form, demands most of all to be opened with promptitude, lest in a paroxysm of forcing and straining to pass water the sac should give way and the urine be extravasated. But since the sympathetic abscess may burst into the urethra, and thus a communication be established with the canal, the risk of extravasation of urine being thereby induced, perineal abscesses, whatever their character or mode of origin, should be opened immediately on the first indication which is given of the formation of matter. And even in the chronic urinary abscess, which gives rise to so little inconvenience, and the cyst of which from being comparatively thick is less likely to give way under the pressure of the urine, early incision should be resorted to. It is surprising what relief is afforded in the case of acute urinary abscess, when an opening is so made into it as to give complete vent to the fetid contents ; the severe pain and

difficulty in passing water cease, the urgent febrile symptoms quickly abate, and the stricture itself is allowed to fall into a partially quiescent state, owing to the new channel established in the perineum, which being behind the obstruction transmits some of the urine. But sometimes an incision must be made in cases of perineal inflammatory swelling, before unequivocal evidence is furnished that matter has formed ; this especially obtains where the inflammation lies beneath the deep fascia of the perineum. Here, even where suppuration has taken place, the presence of pus is not as already explained easy to be detected, owing to the want of the test of fluctuation ; accordingly, whenever the perineum is hard and oedematous, when there is severe pain and more or less distress and difficulty in passing water, and these symptoms are preceded by rigor which is followed by fever, we have sufficient grounds for suspecting the presence of deep-seated matter, and there should be no time lost in making an incision. If matter appear in ever so small a quantity, our object is satisfactorily gained ; if not, the division of the fascia will afford great relief, and in all probability anticipate or check the formation of matter. Indeed, where severe pain and difficulty of micturition exist in connexion with much tension of parts in the perineum, there is obviously deep subfascial inflammation, and there should be no hesitation in making a deep and free incision, even though we may feel convinced that matter is not as yet formed.

In opening perineal abscesses the patient ought to be placed on a table, with his legs drawn up and separated

so as to widen the perineal space as much as possible. A sharp pointed scalpel or a straight bistoury is to be plunged deeply in the direction in which the matter is suspected to lie. If after going a considerable depth, pus does not appear, it is well to withdraw the knife and introduce a strong probe or director into the bottom of the incision, when by making firm pressure with the instrument the cyst of the abscess, if it be near, will be ruptured. As soon as any matter escapes, a probe-pointed bistoury should be passed into the abscess, and the incision enlarged to the necessary extent, carrying the knife in a direction downwards and outwards, somewhat in the line of the first incision in lithotomy. By adopting this method of opening large, deep perineal abscesses, troublesome hemorrhage may be avoided. But if, after going a certain distance, we do not light on matter, it is far more prudent to desist in its further pursuit. It is possible that, though there be considerable swelling, suppuration has not yet occurred; or it may happen that the incision is not in the direct line of the abscess. The knife should therefore be laid aside, the wound filled up with lint, a poultice laid over it, and if there be a collection of matter anywhere in the neighbourhood, it will burst through the incision in twenty-four or thirty-six hours. When a perineal abscess has been freely opened, the pain and distress, as already observed, are relieved and the fever subsides; but in the true urinary abscess, especially the large diffused kind, much debility remains for a long time afterwards, and demands the free administration of wine, bark, and strong nutriment.

Urinary Fistula.—We have seen that when an abscess connected with the urethra, whether directly or indirectly, is opened or bursts spontaneously, a new channel is established which transmits the urine, and thus a fistula is established. This tract is lined with an adventitious membrane presenting somewhat the character of mucous tissue, and it secretes a thin muco-purulent fluid. The quantity of urine that escapes through it will of course depend on the size of its internal opening, and on how far the fistulous tract is oblique or direct. The true urinary abscess—that having its origin in ulceration of the urethra behind the stricture, is the principal source of urinary fistula. The internal opening of all fistulæ is within the urethral canal, generally about the bulb or membranous portion, since it is here the stricture usually lies, and the orifice is always developed behind the obstruction. The external opening is in most instances found in that part of the perineum intervening between the anus and scrotum, but it is frequently met with in the scrotum itself, at the root of the penis, and even on the body of the organ as far forwards as the frænum. Sometimes the fistulous passages take a very circuitous route to distant parts, the external orifice being found above the pubes, in the groins, a considerable distance down the thighs, or on the nates. Occasionally the sinus leads from the urethra to the rectum. The external orifice is indicated in general by a small nipple-like projection of a purplish colour, mounted on a reddish base like a cicatrix ; there appears to be no regular aperture, the opening being filled up with a minute mass of fun-

goid granulations ; but a probe pressed against it readily enters, and can be made to traverse a sinus.

Sometimes the fistulous orifice is so minute that the point of the smallest probe, even that of Anel, cannot be introduced. Still the urine finds its way through in sufficient quantity to cause annoyance. In such cases the means of establishing a diagnosis is to make the individual hold a piece of blotting paper on the perineum, while passing urine and for some time afterwards ; when, if a speck of damp be perceptible on the paper, proof positive is afforded not only of the existence of a fistula but of its exact locality. In some cases, though it is obvious that a fistulous opening exists, owing to the patient's clothes being occasionally wet, the eye cannot detect any actual orifice, and the entire perineum feels perfectly dry ; on very close examination, however, a purplish spot covered with a delicate pellicle, like silver paper, will be discovered, and if the end of a probe be firmly pressed against it, the pellicle ruptures and the instrument enters a sinus. The internal orifice of a urinary fistula is almost invariably single ; not so the outer ; there may be several passages converging to and ending in a tube which terminates in a single opening in the urethra.

There may be two or three external orifices in the perineum, but they are most numerous on the scrotum, which in old cases becomes completely drilled with fistulæ, the areolar tissue being in process of time quite condensed and often obliterated. Hence, after the lapse of a considerable time, it is not uncommon to find the

scrotum contracted and indurated to such an extent as to lose its ordinary appearance and properties, a hard cartilaginous ridge being formed in the centre, corresponding with the raphe and separating the testes ; this in general is freely perforated with fistulous apertures, which transmit the urine. The skin all round is red, tender, and excoriated. The great number of fistulous tracts met with on the scrotum is to be accounted for by the fact that the external orifice of one or more is apt to close temporarily, in consequence of which pus collects in the passage, and thus a small abscess is formed ; and this, instead of opening at the original aperture, bursts near it, and after some time the old one also opens. When there has been much loss of substance as the result of the abscess, the external orifice of the fistula is often large and irregular ; it is usually direct and patulous, and its edges cartilaginous. These are principally met with in front of the scrotum or on the penis, and prove the most troublesome and difficult kind of fistula to cure.

The diagnosis of urinary fistula is so very obvious as scarcely to require any special consideration ; but we must be careful not to confound urinary fistula arising from stricture with that from any other cause.

Fracture of the ramus of the pubes producing laceration of the urethra, consequent escape of urine into the areolar tissue, and formation of abscess and fistula, leads to all the manifestations of a case of fistula in connexion with stricture ; since the broken bone, by displacing the canal, interferes with the expulsion of the urine, and on introducing a catheter an obstruction is encountered.

The following case affords an example of extensive urinary fistulæ depending on fracture of the ramus of the pubes.

A man aged twenty-five years was admitted into Stevens' Hospital under the care of Mr. Cusack. A year previously he fell from a height across a rafter, by which he received a fracture of the left ramus of the pubes. The urethra being torn by the broken bone, there was a considerable extravasation of urine ; diffused abscesses, which spread extensively and irregularly, were formed, and these terminated in fistulæ. There were, besides perineal openings, two fistulous orifices on the inside of the right thigh, at about the junction of the upper and lower third ; one on the left thigh, another in the right groin, and two above the pubes. Almost the whole of the urine escaped through these fistulæ. The urethra was considerably pushed to the right side by the broken ramus, and on attempting to pass an instrument it was arrested by what appeared to be the projecting bone, at a spot somewhat corresponding with the bulb. After the patient had been in hospital for some time, Mr. Cusack adopted the following plan which proved perfectly successful in re-establishing the urethral canal. A small tortuous sinus existed in the perineum : through this the smallest-sized gum-elastic catheter without a stilet was introduced into the bladder. The size of the catheter being gradually increased, the sinus became greatly dilated ; it was then laid open with a knife, and upon careful examination it was found that the impediment to the passage of the instrument was due more to a fold

of membrane than to the broken bone. This ledge of membrane was divided, and a catheter was then without much difficulty passed into the bladder from the external orifice of the urethra. Instruments were retained in the bladder, their size being gradually increased up to No. 12. The dilatation of the canal was slow, two months having elapsed before No. 12 instrument could be introduced. At the end of that time, however, the fistulæ were healed, and the urine passed in a good-sized stream through the urethra. The catheters employed were always of gum-elastic, but even those of the fullest size could never be introduced without the stilet, it being necessary to adopt a certain manœuvre on arriving at the seat of the fracture which a flexible instrument would not admit of.

A case of urinary fistula, especially of aggravated form, is one of the most pitiable met with in practice. Every time the patient passes urine, some escapes through the abnormal channel, wetting his clothes and causing the greatest discomfort. If the fistulous opening be large and direct, so that the urine escapes immediately, the individual can take some precaution against having his clothes wet; but where the channel is oblique or tortuous, the urine dribbles away for a long time after the act of micturition; the clothes therefore cannot be defended from wet, they are saturated with urine, and their constant application to the skin of the perineum, scrotum, groins, and inside of the thighs renders the skin in those situations inflamed, red, and excoriated. When the internal orifice of the fistula is situated in the mem-

branous or prostatic part of the urethra, instead of the dribbling being occasional, it amounts to regular stillicidium. In all cases not the least disagreeable result of the disease is the offensive ammoniacal odour exhaled from the patient's person. When this state of things is allowed to go on for a length of time, the health invariably suffers. Apart from the extreme annoyance and discomfort already alluded to, which keep up constant irritation, there is the effect produced by the purulent discharge from the fistulous tracts, which is often considerable, and the constant succession of abscesses which form in the scrotum and elsewhere. Under such circumstances the patient is apt to fall gradually into regular hectic fever, especially in cases where the health had previously suffered much from the effects of the stricture. If the case be neglected, particularly where it is complicated with very tight stricture and much induration of the urethra and tissues around it, the local irritation is in process of time propagated to the kidneys, and the patient drags on a miserable existence terminating in a lingering death. The cure of urinary fistula is therefore all-important, and it cannot be undertaken too early; for, simple as the case may be, neglect sooner or later leads to bad results. One fistula will lead to another, and to a succession of abscesses; and when the constitution becomes materially affected thereby the ordinary measures adopted for the cure of the disease fail, and those of an operative character though more effective are contra-indicated.

The principle of the cure in urinary fistula is extremely simple, but it is not in every case that it can be carried

into effect. It consists in removing the urethral obstruction, and thus allowing the urine to pass along the canal in a full uninterrupted stream; no urine then escapes through the fistulous tract, which quickly closes, the source of its maintenance being no longer in existence. The surgeon's primary object is therefore to treat the stricture without any regard to the fistula. This is to be done by the passage of bougies every day, or every second or third day, according to the degree of resistance to absorption the obstruction offers. The plan usually adopted is to retain a catheter in the bladder, or to pass one whenever the patient requires to make water, the object being to prevent the urine trickling through the fistula, this circumstance being the supposed sole cause that prevents the fistula from healing. Sir Benjamin Brodie has however shown that both these plans are objectionable. In the former case, after the catheter has lain for some time in the urethra, the canal becomes so far widened as to permit a little urine to escape along the sides of the instrument and through the fistula. Independently of this, the presence of the instrument causes excessive secretion of mucus or muco-purulent matter, which, passing through the sinuses, prevents their healing as effectually as when urine makes its way through them. In the other case, the constant introduction of the catheter produces so much urethral irritation as materially to interfere with the process by which fistulous tracts are obliterated. It follows, then, that the stricture is first to be treated by the bougie on the principle of absorption, and in conformity with the rules which have

been already laid down. When the obstruction is completely removed, and the passage for the urine along the normal channel is thereby re-established, the fistula, unless it be of aggravated form, usually closes; if not, various methods can be resorted to for the purpose of stimulating the tract, and exciting in it the healing action. The best method consists in passing a probe armed with nitrate of silver completely through the sinus, and repeating this every third or fourth day for four or five occasions. The lunar caustic is to be fused in a watch-glass over the flame of a spirit-lamp, and as the liquid cools if the extremity of a probe be immersed in it and turned about, the nitrate of silver solidifies upon the end of the instrument in the form of a small round button. While subjecting the fistulous tract to the stimulating action of the lunar caustic, especial care must be taken not to allow the external orifice to heal. The latter is apt to close long before the sinus has healed at the bottom; the surgeon may be thus deceived, and only learn that he abandoned the treatment of the case prematurely, when after a short time either the old orifice re-opens, or a small abscess forms in its vicinity, and breaking leaves a new outlet. The principal object, therefore, in the treatment of urinary fistula is to obviate premature closure of the outer orifice. When the fistulous passages are long, oblique, and tortuous, as is often the case, there is no method so well calculated to effect their speedy closure as properly directed compression.

In the number of the *Dublin Quarterly Journal of*

Medical Science for August, 1853, an interesting and instructive paper is to be found on the efficacy of compression in the treatment of Urinary Fistula, by Mr. Hamilton of the Richmond Hospital. He was led to adopt this mode of treatment from the result afforded by the inspection of certain pathological specimens, and except in two instances it proved effectual in the cases he subjected to it. In some the cure took place with extraordinary rapidity. Care, however, must be taken not to mistake the mere closing of the external orifice for obliteration of the entire tract. In obstinate cases the actual cautery and the galvanic wire have been employed with advantage, yet there are but few in which the stricture admits of complete removal that will resist the steady employment of the nitrate of silver in the manner described.

It must be borne in mind, however, that rest and the horizontal posture are essential to the successful carrying out of any plan of treatment for the cure of urinary fistula. But the fistula is often prevented from healing in consequence of there not being a sufficient vent for its contents, either externally or by the urethra. In almost all cases the fistulous tract presents more or less of a fusiform shape ; but sometimes the internal and external apertures are so extremely small, while the passage is very wide in the middle, that there must be a permanent lodgment in it of the pus and urine. In these cases the course to be pursued is to enlarge the external orifice, and to carry the incision through the sinus so far as to afford a free exit to the contents. Such partial division,

however, is not always sufficient for the purpose of effecting a cure ; and it may become necessary to lay open the sinus in its entire extent, carrying the incision fairly into the urethra, for which purpose the following plan is to be adopted. The complete or at least partial removal of the stricture is of course supposed to have been previously accomplished. The patient being placed in the position as if for lithotomy, as full a sized silver catheter or grooved staff as can be introduced is to be passed into the bladder, and held firmly there by an assistant. A free incision is next to be made exactly in the mesial line of the perineum down to the urethra, and the internal orifice of the sinus then sought for with a probe ; if there be any difficulty in discovering the opening, its exact situation can be at once ascertained by making the patient pass water. When the probe has been introduced fairly into the urethra, that canal is to be freely divided with a knife, the incision being if possible carried through the stricture should one of any extent exist.

The foregoing observations upon the treatment of urinary fistula relate to that connected with stricture which is subject to the influence of the bougie. When, however, the stricture is unyielding, then the operation for the external division of the obstruction which has been described in a previous chapter must be resorted to. In making the perineal incision, we must take care after dividing the stricture to carry it on so as to include the fistulous tract. But we have seen that the method of dividing a stricture thus is very imperfect, and seldom succeeds ; hence it is of great importance to en-

deavour to perform Mr. Syme's operation in some modified form. There is no doubt that the staff employed by Mr. Syme often admits of being introduced in very difficult cases and when all other instruments have been repulsed ; we may therefore succeed in getting it through, even in the most unpromising cases, by patience and perseverance ; and once this has been accomplished, the complete division of the stricture, the fistulous passages, and all the indurated structure usually existing in the perineum can be effected with accuracy and safety.

We have seen that a urinary fistula may be maintained by the presence of a stricture in the urethra, and also partly from the construction of the fistulous passage not permitting the ready escape of its contents ; but an additional impediment to the healing of the fistula occasionally occurs, viz., the formation of calcareous matter either in the urethra behind the stricture and close to the internal orifice of the fistula, or in some part of the sinus outside the canal. The former is the usual situation where such formations are found, and here they present the shape and other physical characters of a regular calculus. These concretions may have their origin in the urethra, or they may be vesical calculi, which being expelled into the urethra are arrested by the stricture and grow there by accretion. Their principal bulk is almost invariably composed of the phosphates, and where the urine is very unhealthy, being highly alkaline, the calculus increases in size with remarkable rapidity, since the urine is regularly filtered in passing through the fistulous opening in the canal. Whatever be the exact

manner in which the calculus is formed, when it lies in the urethra it cannot fail to greatly increase the difficulty in passing urine, and other distress arising from the stricture. No time, therefore, should be lost in effecting its removal as soon as its existence is ascertained. When this is accomplished, steps should be taken for restoring the urine to a healthy condition, otherwise calculus may re-form in the same situation. In the following instance two calculi, which seem each to have had its origin in the bladder, were found in the urethra in connexion with fistula within the period of one year. Both were extracted by simply making a free incision into the perineum, and laying open the urethra.

I. B. a pensioner, aged thirty, of delicate appearance, was admitted into Steevens' Hospital for stricture of the urethra combined with a perineal fistula. This man gave the usual history of the origin and progress of the two-fold disease under which he laboured; but stated that about three years ago, before he perceived any decided obstruction to the escape of urine, and a considerable time prior to the formation of the fistula, he suffered a good deal from urinary irritation. At this period he was quartered with his regiment at Norwich, and upon consulting one of the surgeons of that town he was informed that there was a calculus in his bladder, and that he should undergo an operation for its removal: to this he would have submitted had it not been for the sudden arrival of the route for Ireland. On his admission into hospital he complained of great difficulty in micturition, and I found a tight stricture in the ordinary

situation, through which I could with difficulty pass a gum-elastic catheter of No. 1 size: the urine was alkaline, and was loaded with muco-purulent matter and the phosphates.

Having by degrees succeeded in dilating the urethra, so as to be able to pass a No. 6 instrument, I tried a metallic catheter of that size, which appeared more easy of introduction: but, while depressing it, I could feel a distinct grating sensation. I now introduced a probe through the fistula, and the same sensation became still more manifest. The nature of the case was obvious; a calculus lay in the urethra behind the stricture; accordingly I took immediate steps for its removal. A grooved staff being introduced into the urethra, an incision was made in the perineum and the canal freely opened, when a calculus larger than an olive was extracted. The original size of the calculus must have been much greater; but owing to its exterior being exclusively composed of phosphate of lime, it crumbled down considerably during the efforts to extract it. The stricture was now quickly and completely cured, and the abnormal character of the urine removed; but the patient left hospital before the incision in the perineum was entirely closed. In about a year afterwards he applied for re-admission, complaining of all his former symptoms. After a few days, when the stricture was sufficiently dilated to admit a metallic catheter, I again experienced a grating sensation in the same part of the canal, and was enabled, as before, to confirm the impression thus communicated, by passing a probe through the fistula, which still existed. An ope-

ration similar to the previous one was performed, and a calculus as large, but much harder than the other, was extracted with ease. It was also composed of phosphate of lime.

So much for the treatment of ordinary perineal fistula. Those fistulæ which form in the spongy part of the urethra, especially such as have resulted from much loss of substance, are far more difficult of cure. These are met with principally at the root of the penis, immediately in front of the scrotum ; but they may appear on any part of the penis as far as the glans. In almost all cases they are direct and patulous, so much so that if of large size the interior of the urethra is exposed to view. When the opening is small and circular, it may be made to close by a few applications of strong nitric acid to the edges. If, however, the fistulous opening be large, and its margin hard and gristly, no method short of paring the edges and approximating them with sutures can effect any good. A moderate-sized catheter is first to be introduced into the bladder, and the edges of the opening being neatly cut off, one or more needles (according to the extent of the aperture) of the smallest size are to be passed through them, and the twisted suture then applied. When this operation has been neatly performed, it gives at first every promise of complete success ; but generally, when the support afforded by the needles is withdrawn, the line of union flies open and the case becomes worse than it was before. The chance of this event occurring bears of course a direct proportion to the size of the opening, and the strain thus exercised on the surrounding

parts ; but unfortunately, even where the fistula is of moderate size, the operation is very apt to fail. The frequent erections which take place cause the sutures to tear through before the adhesive process has established a sufficiently firm bond of union, and though the erections may be in great measure controlled by anodyne enemata, or camphor and opium administered internally, it is difficult to subdue them to the extent necessary for our purpose. But should the aperture exceed a certain limit, no measure short of borrowing a piece of skin from the neighbourhood will suffice to close it in. Several different plans of urethro-plasty have been recommended, and no surgeon has exhibited more skill and ingenuity in this, as well as in all other operations of a plastic nature, than the late Mr. Dieffenbach. An account of his operations is to be found in the tenth volume of the *Dublin Medical Journal*, first series.

Urethro-rectal fistula is also very troublesome and difficult to cure. When this form of fistula is of small size, it gives so little inconvenience that the patient is often unaware of its existence ; or, if he be cognisant of it, deems his case unworthy of any special surgical treatment. Not so those which are so large as to allow much urine to escape into the rectum ; here the individual is in a wretched condition, being obliged every time he desires to pass water to place himself in the position for evacuating the bowels. The action of the rectum in expelling the urine leads in general to some discharge of fæces, and in process of time a sort of chronic dysentery is thus induced. The mucous membrane of the gut also becomes irritated by the con-

tact of the urine, and the skin about the anus excoriated from the same cause, so that it is difficult to conceive a more miserable or pitiable case. There are few the subject of such disease that would not diligently seek for a cure, and be willing to undergo any operative ordeal calculated to effect that object.

If the opening be small, its closure may be accomplished by touching it a few times with strong nitric acid, which can be carried to it through a glass speculum. In the event of this failing the actual cautery may prove effective. When, however, the aperture is large, these measures are of no avail ; the edges must be seared with the actual cautery or pared with a knife, and then approximated by means of a suture. This operation is very difficult and troublesome, and even where it has been to all appearance satisfactorily performed, it rarely meets with a successful issue. We must not, however, abandon the case if the first operation be unsuccessful ; the second or third effort has sometimes succeeded, though the first signally failed.

CHAPTER IX.

INFILTRATION OF URINE.—From ulceration of the urethra behind stricture.—Symptoms of infiltration, local and constitutional.—Infiltration from urethral calculus.—From rupture of the urethra, the results of falls and blows.—From false-passage.—Gangrenous erysipelas of the scrotum confounded with infiltration of urine.—Diagnosis.—Treatment.—Rupture of the bladder.

WE have seen that in cases of tight stricture of long standing the urethra becomes dilated behind the obstruction, and this dilated part undergoes various morbid changes, of which ulceration is the most common and the most serious in its results. In the last chapter it was shown how this morbid effect, by permitting the escape of urine to a limited extent into the areolar tissue, will cause urinary abscess and fistula. But ulceration of the urethra behind the stricture often entails far more formidable consequences than this, leading to rupture of the canal, and wide-spread extravasation of urine into the areolar tissue of the perineum, scrotum, and penis; the result of which is complete destruction not only of that tissue but of the superjacent skin. The urethra, thinned by the ulcerative process, and partly as the result of mechanical dilatation, is unable to resist the expulsive power of the bladder, increased so much by

hypertrophy of its muscular fibres ; the counter-resistance offered by the stricture aiding the force exerted. The urine, passing along the canal, therefore exercises its pressure mainly on the weakened spot, which, giving way, opens a means of egress for the fluid into the areolar tissue. The same effect may, as has been already stated, result from rupture of the walls of a urinary abscess.

When urine has become infiltrated, the event is indicated by unmistakable signs, which are quickly followed by remarkable changes. During a paroxysm of unusual forcing and straining to pass water, the patient feels as if a rupture of some spot in the urethra had taken place, and he soon experiences the sensation accompanying the evacuation of the bladder. To his astonishment and dismay, however, no urine appears, but he perceives the scrotum to become swollen, exhibiting precisely the appearance presented in anasarca. The patient, however, is less alarmed than the surgeon to whom he applies ; for the latter, at once recognising what has occurred, knows the serious results that are to follow. The distance and the degree to which the areolar tissue is infiltrated varies greatly ; in some cases the perineum and scrotum only are injected, and that slightly ; in others, these parts are enormously swollen, and the penis and groins are also involved ; while in bad cases it is not uncommon to find the urine extravasated above the pubes, and as high as, or even higher than, the umbilicus, and in some instances taking a course round the loins to the back. When urine comes in contact with areolar tissue, it proves

most deadly to that structure, exciting inflammation in it which ends in gangrene or suppuration, often in both.

Let us trace the course of an ordinary case. The perineum is very firm to the feel, more or less tender on pressure, and swollen, the amount of the swelling varying greatly according as to whether there was tendency to suppuration or not. If an abscess has formed, or is in process of being formed, there is considerable tumefaction, with great pain and tenderness on pressure. The scrotum is at first simply swollen, the skin being undiscoloured; but after the urine has lain a short time in the areolar tissue, inflammation is set up, the skin quickly reddens, and the swelling of the scrotum becomes so much increased that its rugæ are completely obliterated. By degrees the redness of the integument assumes a deep dusky hue, phlyctenæ filled with a purplish serum form over the surface, and, bursting, leave as many black patches. These rapidly coalesce, and the entire skin of the scrotum perishes. The slough presents a black or more usually leaf-green colour, and crepitates on being pressed. When the dead skin is detached, the subjacent areolar tissue is also found in a state of gangrene; it is of a yellow colour, exhibiting the appearance of a piece of wetted chamois-leather stretched across the testes. In process of time this slough is separated, and the testes are left bare down to the tunica vaginalis in which they are suspended. When all the dead structures are thrown off, the reparative process rapidly sets in. It is incredible how expeditiously granulations spring up, and over-spread the denuded surface; and still more so, how

small a cicatrix is left after the part is healed, owing to the loose and yielding nature of the scrotum giving full play to the contractile power of the granulations.

When the subcutaneous areolar tissue of the penis is infiltrated with urine, similar local changes to those described occur. But we have seen that the extravasation of urine may extend into the groins, above the pubes, and up the abdomen as high as, and higher than the umbilicus. Whenever red lines are observed running in the direction of the spermatic cord to the crest of the ilium, there can be no doubt the urine has taken that course; the parts soon become oedematous, and unless prompt measures be adopted, sloughing or suppuration occurs. As a general rule, in parts so remote from the seat of rupture as the groins and abdomen, suppuration, not sloughing, takes place. In the former situation the matter exhibits itself in the shape of a chain of small abscesses, along the course of the spermatic cord. Larger islands of pus present themselves above this point, nearer to the umbilicus; and when these are not opened early, the matter is apt to burrow under the skin to a considerable extent, sometimes running along the parietes of the chest towards the axilla, close to which it may eventually burst. All such collections of matter differ in their character from ordinary abscesses; they are barely elevated above the surrounding surface, and instead of yielding distinct fluctuation, communicate a soft doughy feel. The pus they contain is fetid, and of small amount compared with the size of the cavity, in the bottom of which is almost invariably found a slough of

areolar tissue, presenting the appearance of a bit of wetted tow or chamois leather.

Three circumstances seem principally to influence whether suppuration or sloughing of the areolar tissue is to occur,—the force with which the urine is injected, the degree of distention of the cells of the areolar tissue, and the quality of the urine. Where a large quantity of urine has been propelled so as to forcibly distend the cells of the areolar tissue, and the fluid is concentrated and of unhealthy character, (especially if it be alkaline, and mixed with mucus or pus, which is often the case) sloughing inevitably results. But should the urine be comparatively healthy, should it be feebly injected into the areolar tissue, the cells not being much distended, the action set up falls short of sloughing, and leads only to suppuration. It follows, therefore, that in the remote parts sloughing is not likely to occur, because here the force with which the urine is injected is in great measure exhausted. In bad cases, however, where the bladder is much hypertrophied, the stricture very close, and the urine highly stimulating from being long retained, the areolar tissue even as high as the umbilicus will become rapidly gangrenous. On making an incision into it, it presents a greenish color, and a brownish fluid mixed with small bubbles of air escapes. The skin would of course, as a necessary consequence, perish like that of the scrotum and penis in process of time; but this event is almost invariably anticipated by the rapidity with which death supervenes in cases of extensive infiltration.

So much for the regular order of local changes which

occur in this disease : the constitutional changes are equally formidable.

Almost immediately after the escape of urine into the areolar tissue, the patient is seized with a severe rigor, often followed by vomiting, and fever is rapidly kindled. This fever is usually of a more or less sthenic character at first, but it runs into the opposite type with a rapidity proportioned to the extent of the extravasation and the age and feebleness of the patient. The pulse soon becomes rapid, small, and weak, the tongue dry and brown, the respiration is hurried, there are anxiety, restlessness, loss of sleep, and great prostration of strength. When the individual is advanced in years, the bladder much diseased, the urine very unhealthy, and especially if the extravasation be extensive, sloughing rapidly supervenes, there are no appreciable febrile symptoms of an inflammatory character, the system becomes at once prostrated and low typhoid fever is established. When the extravasation of urine is confined to the perineum, scrotum, and penis, if the case is promptly and properly treated, recovery in general takes place ; but where the extravasation reaches to the umbilicus, and sloughing instead of suppuration occurs, the case, except in rare instances, proves fatal. Under any circumstances a fatal issue is denoted by the following symptoms :—the pulse becoming very quick, ranging from 130 to 140, feeble, irregular, or intermittent; the belly being swollen and tympanitic; hiccup ; the teeth and lips covered with sordes ; the skin assuming a jaundiced hue, and being covered with a cold clammy sweat ; jactitation occurring, and often

subsultus tendinum ; and the countenance presenting the hippocratic expression, which once observed can never be mistaken. The intellect is unimpaired for a long time, even though the typhoid symptoms have considerably advanced ; the patient may fall occasionally into a drowsy state, but he is easily aroused, and then answers questions, and expresses his wants with accuracy ; twelve hours at least before death, however, coma sets in, there is gradual loss of consciousness, and in this state the sufferer sinks and dies. Sometimes the coma is attended with loud stertor, but there is reason to believe that this symptom results not from the effects of the infiltration, but chiefly from urinary apoplexy produced by suppression of the renal secretion.

The case which has been described, though looking so formidable from the extensive sloughing that meets the eye, is much less dangerous than some other forms of infiltration of urine. In that which has been considered, the urethra gives way in front of the triangular ligament ; but when the rupture occurs far back in the canal, so as to be behind the triangular ligament, unless the urine bursts through that fibrous structure, it comes to be extravasated into the areolar tissue around the neck of the bladder and in the pelvis, and this event is almost inevitably fatal. The fatality of these cases is doubtless greatly increased by the readiness with which extravasation of urine in this situation can escape detection, and the difficulty of dealing with it, when recognised, in the same decisive and satisfactory manner as in the other form of infiltration. It has frequently happened that a

patient has died from this affection without the surgeon being aware that there was any rupture of the urethra, or escape of urine in a wrong direction ; and, indeed, there is but little to guide to a knowledge of the occurrence, for the scrotum and penis are unimplicated and the perineum rarely presents decided tumefaction. Still the skilful surgeon can seldom fail to arrive at a knowledge of the nature of the case, provided he obtain a satisfactory account of its history. If it be ascertained that the patient has laboured long under very tight stricture, being unable to pass water without employing excessive force ; that on the occasion of an unusually violent effort the sensation of a rupture in the urethral canal was experienced, and since then there was inability to expel the urine : further, if on examination the perineum be found firm, tense, and painful on pressure ; that there are tenderness over the hypogastric region and fever more or less of the character of that which accompanies the other form of infiltration, there can be little doubt but the urethra has given way behind the triangular ligament, allowing the urine to be extravasated into the areolar tissue of the pelvis. Where the extravasation of urine is extensive, the constitutional symptoms are very urgent, and the patient speedily sinks.

A still more formidable event is where the urine is infiltrated into the corpus spongiosum of the urethra. This is indicated by a black spot on the glans penis, and when it appears the case may be viewed as utterly hopeless.

The rapidity with which mortification occurs in infil-

tration of urine depends on the three circumstances already alluded to, namely, the force with which the fluid is injected, the degree of distention of the areolar tissue, and the unhealthy character of the urine. Where there is a large quantity of urine, the bladder very powerful, and the stricture very tight, the fluid is injected with great force, and the cells of the areolar tissue become forcibly distended; the contact of unhealthy urine, too, acts as a strong irritant. Gangrene seldom sets in before forty-eight hours from the escape of the urine into the areolar tissue, but I have known it to occur so early as four or five hours afterwards, as in the following case :

W. C. aged about twenty-five, laboured under stricture for two or three years. He never subjected himself to proper treatment, and lived a very drunken, dissipated life. At length the symptoms arising from the stricture became greatly aggravated; he had to force violently to empty the bladder; the calls to micturate were frequent; muco-purulent matter was copiously discharged, and the urine assumed an alkaline reaction. Under these circumstances a urinary abscess formed in the perineum, and during a paroxysm of violent straining to pass water its cyst gave way, and the urine was extravasated into the areolar tissue of the perineum, scrotum, and penis. In five hours after this occurrence black spots were observable on the scrotum, and in a few more the entire skin was converted into a slough. Urgent constitutional symptoms rapidly supervened, and the patient was reduced to a condition of extreme exhaustion. A free incision was made into the abscess in the perineum, by

which vent was given to fetid urine and pus, and the scrotum was extensively scarified. The sloughing was not confined to the scrotum; livid patches appeared almost simultaneously on the penis, and its integuments perished. A few gangrenous spots also formed above the pubes, and a chain of small abscesses presented themselves along the course of the spermatic cord on the right side. Notwithstanding the rapidity with which the gangrene set in, it being doubtless the result chiefly of the morbid state of the urine, and in great measure attributable to the patient's bad condition of health, he recovered with remarkable rapidity, all the sloughs having been cast off, and the parts cicatrized before the usual time.

The period at which death occurs in infiltration of urine ranges from four to eight days, the fourth day being the usual time; but where the extravasation is very extensive, and the patient has previously been in a feeble state of health, it takes place much earlier.

But infiltration of urine depends on other causes besides stricture, viz., ulceration of the urethra from impaction of a calculus; or rupture of the canal, the result of falls or blows on the perineum, and injuries inflicted by instruments employed in the treatment of stricture; and it becomes very necessary to discriminate between these cases of extravasation and those resulting from stricture. The first source of urinary infiltration reveals itself in general so obviously that it can hardly lead to any deception. When it is ascertained that the difficulty of micturition has occurred suddenly, and is accompanied by

greater pain than that belonging to stricture, that the attack has been preceded by pains or uneasiness in the vicinity of the kidneys, and that clear evidence is adduced to show that no stricture pre-existed, there can be little doubt that the urethral obstruction and the extravasation of urine are produced by the presence of a calculus in the urethra. This inference is converted into certainty when, on introducing a sound or metallic catheter, the instrument can be felt to strike against a calcareous body. Urinary infiltration from this cause is more usually met with in young children ; but here the grounds of diagnosis are sometimes only inferential, the conclusive evidence not being procurable in consequence either of the difficulty which often exists of introducing a metallic instrument in childhood, or from the circumstance of a fold being thrown up in front of the calculus which intervenes between it and the instrument.

But erythematous swelling of the scrotum and penis, unconnected with urinary infiltration, or the presence of a urethral calculus, is occasionally met with in children ; and this fact should be borne in mind, lest any serious mistake be made as to the nature of the case. It has happened that the surgeon, arriving at too speedy a conclusion in an instance of this kind, has cut down on the perineum, and laid open the urethra, having learned his error by the event of the proceeding.

The second cause of urinary infiltration is more common than the former, and unless a satisfactory history of the case be furnished it is also very likely to give rise to mistake. A man receives a violent blow or fall on the

perineum, this ruptures the urethra, blood flows from the canal, and more or less is extravasated into the areolar tissue outside it; as soon as he experiences the desire to pass urine, unaware of the consequence he endeavours to expel it; the result is, little, if any escapes externally, it finds its way through the rent in the canal, and becomes extravasated. The surgeon attempts to pass a catheter, but it is in general obstructed by the lacerated opening, hence he may be led to conclude that a stricture exists; the nature of the case, however, is revealed by a history of the accident and its being ascertained that blood has escaped from the urethra, no urine, or only an amount very much disproportioned to what must have been contained in the bladder, having been expelled externally: all doubts are removed as soon as ecchymosis of the perineum and scrotum presents itself.

Unless the individual have endeavoured to pass water after the accident no mischief can occur, because no urine can be extravasated; hence he should be always questioned on this point before steps are taken to treat the case. If, having attempted to pass water after the injury, he experienced the sensation attendant on evacuating the bladder, and that no urine was expelled externally, or only a very small quantity, there cannot be any doubt entertained that urine has been extravasated. But the co-existence of urine with blood in the areolar tissue of the scrotum and penis can be in general distinctly recognised by the fact that the urine extends beyond the limits of the effused blood, and pre-

sents a clear œdematosus swelling around it, which contrasts with the darkness of the ecchymosis.

Extravasation of urine from the two last causes described produces similar results to those which occur in the case of rupture of the urethra from stricture; but in a minor degree, because the conditions already noticed, upon which extensive effusion of urine and corresponding mortification depend, are in great measure absent. The bladder not being abnormally increased in strength, and there not being urethral obstruction capable of offering the same degree of counter-resistance as in stricture, the urine is not injected with equal force, and the cells of the areolar tissue are therefore not much distended; the urine too is healthy, and is consequently much less destructive to the areolar tissue than that which is concentrated from being long pent up in the bladder, or alkaline and mixed with mucus and pus. Hence suppuration is more apt to occur here than gangrene, and when the latter does take place, it is comparatively limited.

The third cause of infiltration of urine alluded to, that resulting from wounds of the urethra by bougies or catheters, is fortunately rare. It has been already shown that false-passage seldom leads to extravasation of urine, as the opening lies in front of the obstruction; but it occasionally happens that the instrument, after passing through the stricture, does injury to the canal behind it. When the individual himself passes the instrument, either from its being of a bad shape or improperly directed, the upper wall of the urethra may be wounded; yet here the scrotum is often but slightly infiltrated, the

urine being principally extravasated into the areolar tissue beneath the skin of the abdomen. The subjoined case, which recently came under my notice, is an example of this accident and its consequences:—

Mr. ——, aged forty-five, twenty years ago contracted chancre, which, assuming phagedenic characters, destroyed the glans and a considerable portion of the penis beyond it. This resulted in a very close contraction, which extended a short distance along the urethral canal. At first he subjected himself to proper treatment, but having learned the use of bougies, he withdrew himself from professional assistance. For a few years past he resorted to the employment of instruments only when he experienced more than usual difficulty of micturition, or was seized with retention of urine; either of which events invariably occurred after his being exposed to cold or wet. Latterly he employed a silver catheter of No. 3 size; it was sharp at the point, and curved in such a manner as rendered it liable to injure the upper wall of the urethra in its passage along the canal. He never introduced this instrument without doing some mischief, as was evidenced by the escape of blood and subsequent irritation. On the last occasion, having been seized with retention of urine after much exposure to cold and wet while fishing, he endeavoured to introduce the silver instrument, being in a sitting posture; the result was that he hurt himself more than in any previous instance, drew more blood, and failed to accomplish his object. After the lapse of about two hours, he was enabled to expel as much urine without the aid of an

instrument as relieved his present distress. This took place on Tuesday night, and he sought for no surgical advice until the latter part of the following Friday, when I saw him. At this time there were œdema and redness extending along the groins, and reaching from the pubes nearly to the umbilicus. The account given by the patient made it obvious that in attempting to pass the sharp silver instrument while in the sitting posture, he perforated the upper wall of the urethra, and that the wound thus inflicted permitted the escape of urine into the areolar tissue, the quantity extravasated being materially added to every time he attempted to empty the bladder. A good deal of fever was present ; the pulse was quick, tongue dry, the stomach irritable, and respiration hurried. No time was lost in carrying out the appropriate measures. Wherever incisions were made the areolar tissue presented a greenish hue, and in some places dark coloured urine mixed with bubbles of air escaped. The striking peculiarity in the case was the almost total absence of tumefaction in the perineum, and the slight amount of œdema of the scrotum that existed. The next morning the redness and swelling had extended along the abdomen considerably, and had turned somewhat round the loins ; the constitutional symptoms were also aggravated. From this period the alarming character of the case rapidly increased. The swelling spread above the umbilicus and round to the back ; hiccup set in, the pulse became rapid and very weak, but the intellect continued unimpaired. He remained in this state for twenty-four hours, which brought him to Sunday

morning. In the middle of that day he fell into a semi-comatose state, his countenance exhibited the remarkable hippocratic expression, his skin was bathed with a cold clammy sweat, there was utter prostration of strength, and in this state he gradually sank and died at nine o'clock in the evening, exactly five days having elapsed from the occurrence of the accident that led to the extravasation of urine.

Notwithstanding the marked character, local and constitutional, of infiltration of urine, the disease has been sometimes confounded with one of a very different nature—gangrenous erysipelas of the scrotum. This affection has been described by the late Mr. Liston under the title of “acute anasarca,” or “inflammatory œdema” of the scrotum ; and according to his opinion it is not substantially inflammatory. He says, alluding to the swelling of the scrotum, “This distention is or is not attended by redness or erythema of the surface ; but there is reason to think, from the suddenness of the accession, and from the appearance on exposing the cellular tissue, that there is no actual inflammation of its texture, there being no induration, nor any appearance of lymph or puriform fluid in the areolæ.”

That the affection here described is, however, of an inflammatory character is obvious from the fact of the great constitutional disturbance preceding and accompanying it. The sloughing of the areolar tissue which occurs does not, it is true, altogether result from intensity of inflammatory action, but in great measure from the mechanical distention of the cells by the effused serum.

Yet the severe rigor that ushers in the attack, and the sthenic fever which at first presents itself, merging afterwards into a low typhoid character, are circumstances entitling the affection to be classed with those of the erysipelatous family. A case of this disease bears the appearance in every respect of one of infiltration of urine. There is erythematous redness of the scrotum, followed by swelling and oedema which efface the rugæ, and the skin and areolar tissue slough, leaving the testes covered only by the tunica vaginalis; constitutional disturbance of a like character also accompanies the local symptoms. The integuments of the penis often participate in the redness and swelling, and even gangrene sometimes follows. Red lines may be also observed running in the direction of the spermatic cords, or patches above the pubes which cannot be distinguished from those indicating effusion of urine in these situations. Abscesses are also met with, containing dead areolar tissue and fetid air.

The confounding pure gangrenous erysipelas with the effects of infiltration of urine is of little if any importance; but the converse of this mistake leads to serious consequences, because those measures upon the prompt adoption of which the safety of the patient depends in the latter instance are omitted. It is only at first, however, that any difficulty can be experienced in discriminating these diseases; a proper investigation of all particulars will soon dissipate doubts and reveal the true nature of the case.

Apart from the fact that in gangrenous erysipelas a

full sized instrument can be introduced into the bladder, that the urine can be expelled in a copious stream, and that the patient declares he has never laboured under any urinary complaint, there are striking points of difference between it and the effects of urinary infiltration. In the former, the redness of skin precedes or is at least co-eval with the swelling, which, no matter to what extent it may reach, is comparatively slow and progressive ; in the latter, the swelling is first exhibited, and is sudden in its appearance, the cutaneous redness, except in very bad cases, not presenting itself until the urine has lain some time in the areolar tissue. I am aware that the line of distinction here drawn between these two affections of the scrotum would not hold good, if the view taken by Mr. Liston of what he termed “acute anasarca” of the scrotum, and which is obviously identical with gangrenous erysipelas, were strictly correct. I am confident, however, that this distinguished surgeon’s opinion of its being primarily and mainly an affection of the areolar tissue, and not decidedly inflammatory, was based on what he may have witnessed in those cases of imperfectly-pronounced erysipelas sometimes met with in old persons whose systems had been enfeebled and depraved by habits of dissipation in early life. But the most distinguishing feature of gangrenous erysipelas is the freedom from all swelling and pain in the perineum ; whereas, in infiltration of urine, even when the fluid does not burst through the fascia, there is, if not actual tumefaction, hardness and tenderness on pressure in the perineal region. Lastly, in gangrenous erysipelas,

though the fever is often very low and accompanied by great debility, the constitutional symptoms are never, *cæteris paribus*, so urgent, nor the prostration so excessive as in infiltration of urine. The case which follows is a good example of gangrenous erysipelas of the scrotum, the points to be depended on for diagnosis being prominently marked :—

J. T., aged thirty, of intemperate habits, was admitted as a patient into Steevens' Hospital. The scrotum was greatly swollen, the skin being of a deep dusky red hue, covered with purplish-coloured phlyctenæ. The penis was also much swollen, the subcutaneous areolar tissue, particularly that of the prepuce, being greatly infiltrated ; the skin was of a very deep red colour, and on the under surface of the organ was a large vesication filled with brown serum. Broad red lines extended along the groin to the anterior superior spine of the ilium on each side, and a diffused patch of redness was observable above the pubes. There was considerable constitutional disturbance ; pulse, 100, weak, and compressible ; tongue coated with a yellow fur ; great thirst and restlessness. The patient stated that three days ago he was seized with a severe rigor, which was followed by nausea and vomiting, and shortly afterwards he perceived that the scrotum had become slightly red and swollen. These two conditions gradually increased, and in the course of forty-eight hours, phlyctenæ were observable. He could pass urine in a full stream, and a large catheter was introduced without any difficulty into the bladder. The perineum was quite disengaged. It became evident that

the case was one of gangrenous erysipelas originating in the scrotum, and not infiltration of urine, to which it bore so strong a resemblance.

Free incisions were made through the integuments and areolar tissue of the scrotum, which gave vent to much dark-coloured serous fluid; but, notwithstanding this measure, sloughing ensued, and the entire of the skin perished save a narrow border all round. The areolar tissue perfectly dead, then came into view, being spread out over the testes, and looking precisely like a piece of wetted chamois-leather. Six days had now elapsed from the first appearance of the erythematous condition of the scrotum. A large slough formed on the under surface of the penis where the vesication had appeared, and a number of small abscesses presented themselves along the groins and above the pubes; when these were opened, pus and long shreds of dead areolar tissue were evacuated. The sloughs in the scrotum were first cast off, those on the penis at a somewhat later period, healthy granulations rapidly sprung up, and it was surprising how small in extent were the cicatrices that remained, especially in the case of the scrotum, nearly the whole skin of which was destroyed. The local treatment consisted in making free incisions and the employment of poultices, with warm dressing and other stimulating applications. The general plan involved the administration of bark with carbonate of ammonia, and the free use of wine, porter, and strong nutriment.

In the treatment of infiltration of urine three main objects are to be kept in view:—1st. to prevent any

further escape of urine into the areolar tissue; 2nd. to give vent to that already extravasated; 3rd. to combat the accompanying fever, and support the patient's strength during the depression and exhaustion belonging to the sloughing stage of the disease. The first object is attained by making a free incision in the middle line of the perineum, thus establishing a dependent opening for the discharge of the urine from the bladder. If, as is so frequently the case, a perineal abscess exists or be in progress of formation, the incision fulfils a double purpose, and we are afforded thereby a good guide for the knife. When there is no tumefaction of the perineum, it becomes more difficult and troublesome to lay open the urethra to the proper extent. If the smallest-sized instrument, even a cat-gut bougie, can be passed through the stricture, it will serve to some extent as a guide for the knife; but should the obstruction be impenetrable, a staff must be introduced as far as the stricture, and the operation described in the eighth chapter be performed. The stricture ought if possible to be included in the incision; but should a difficulty be experienced in effecting this object, as the situation of the obstruction is pointed out by the staff, the urethra can be laid open behind it, which for present purposes is equally advantageous. In some instances Mr. Syme's staff will admit of being introduced, and this affords a sure guide for the division of the stricture and the satisfactory opening of the urethra. When this step has been accomplished a gum-elastic catheter is to be introduced into the bladder through the perineal incision, and fixed

there, in order to afford a direct channel for the escape of the urine, and to securely guard against any further infiltration. Where an abscess has existed it is hardly necessary to introduce any conductor for the urine, since the cyst serves nearly to the same extent the purpose to be fulfilled.

The first indication having been satisfactorily carried out, the second should be attended to. Incisions are to be made through the skin and areolar tissue wherever urine has been extravasated, so as to allow it to drain out. The sooner this measure is adopted the better. If the case be seen early, before the skin has become red, small punctures will suffice ; but when the scrotum is inflamed, especially when gangrene appears, the incisions must be extensive, care being taken to carry them completely through the depth of the areolar tissue. Sometimes the surgeon does not see the case until the whole of the skin of the scrotum and penis has been destroyed, the sloughing supervenes with so great rapidity ; here it will be necessary to make three or four incisions, which should extend the full length and depth of the gangrenous structures. We are then to make such applications as will best facilitate the separation of the sloughs. At first fomentations composed of decoction of poppy-heads with camphorated spirit, in the proportion of an ounce of the latter to a pint of the former, will be found extremely useful ; also simple linseed-meal poultices. When the dead parts begin to exhibit a line of separation, these applications may be advantageously changed for those of a more stimulating nature, such as the fermenting poult-

tice, the warm dressing, balsam of Peru, and tincture of benzoin. As soon as the sloughs are sufficiently detached, they are to be carefully and gently cut away with a pair of scissors. When granulations have overspread the surface, the treatment should be similar to that for any other simple purulent or healthy ulcer ; but especial care must be taken to draw forward whatever portion of scrotum has escaped the destructive process, so as to diminish as much as possible the transverse breadth of the sore, and thus assist the natural contraction of the granulations. When this has been properly done it is surprising what a small cicatrix remains, though not more than a very narrow border of old skin may have been left.

Wherever the urine is extravasated, the same rule of making early incisions is to be observed. When there is œdema above the pubes and there are red lines running along the groins, we may feel assured that urine is infiltrated in these situations, and there should be no delay in adopting a similar course to that which has been pointed out with respect to the scrotum and penis. Wherever the areolar tissue is most sloughy, the part feels soft and boggy and is rather depressed. We should therefore look out for these spots and there make the incisions ; but it is seldom necessary to carry them to so great a length as in the scrotum ; they must, however, extend to the bottom of the areolar tissue. It has been already stated that when urine is extravasated into the groins and above the pubes, suppuration is more apt to take place than sloughing, and that it is common to

meet with a chain of small abscesses extending in the direction of the spermatic cords, and one or more abscesses of larger size somewhere between the pubes and the umbilicus. These abscesses must be opened early ; if they be allowed to burst, ulcers are left which are often very slow in healing, or they insidiously undermine the skin and destroy a large portion of the areolar tissue before pointing.

The third indication involves constitutional treatment. At the commencement of the case, when the fever is somewhat inflammatory, the pulse being quick, the tongue foul, and the skin hot, mild diaphoretics, gentle aperients, and simple, non-stimulating diet constitute the course to be pursued. In this formidable disease, however, the first stage seldom lasts long, for as soon as the sloughing sets in, the fever becomes low and typhoid, the prostration and depression bearing a direct proportion to the extent of the gangrene. In cases in which the sloughing occurs rapidly and is extensive, particularly where the person is advanced in life, there is not any constitutional disturbance of an inflammatory character, as the system is at once prostrated. When the fever is low and typhoid, it is necessary to administer wine, brandy, and strong nutriment, the amount of the stimulants being increased in proportion as the powers of life are inclined to sink. Sometimes brandy must be given in immense quantities. Carbonate of ammonia in large doses is an excellent medicine where there is much exhaustion of the nervous system ; it may be given in combination with infusion or decoction of

cinchona bark, if there be no irritability of stomach ; but as a general rule the latter medicine is more advantageous in the after stages of the affection, when the sloughs are being detached, the fever having abated, and the tongue beginning to clean. Sulphate of quina also proves of great service at the same period.

In the early stage opium is the medicine we should principally look to for decidedly beneficial action. The patient rarely suffers absolute pain, but there are other symptoms present, such as restlessness, loss of sleep, and general anxiety, which are equally controlled by opium when judiciously administered. At first Dover's powder is the best form in which this medicine can be given, but as the stages of the disease advance, the anxiety, restlessness, and jactitation increasing, it will be advisable to change it for solid opium, either alone or combined with sulphate of quina.

But important though the constitutional treatment be, the local is still more so in all cases of infiltration of urine. It is often surprising how a patient nearly in a state of collapse will rally in the course of a few hours after free vent has been given to the urine by properly directed incisions.

If the attempt to divide the stricture or to introduce an instrument into the bladder from the external orifice of the urethra have in the first instance failed, as soon as a decided check has been given to the sloughing, and the fever begins to lessen or alter its character, attention should be directed to the stricture,. The obstruction will be found more easily penetrable than

before the infiltration occurred, because the establishment of a channel for the urine through the perineum, by leaving the stricture in a quiescent state for some time, causes it to relax more or less. As a general rule it is advisable not to run the risk of causing irritation or of augmenting the fever by commencing the use of instruments early; but in cases where there has been an abscess, care must be taken not to delay too long; for should the cyst become filled with granulations, they may protrude into the urethra, and this necessarily leads to contraction of the canal unless it be obviated by the passage of instruments. As soon as a fair sized catheter can be introduced, the opening in the perineum will quickly close.

The treatment of infiltration of urine from rupture of the urethra resulting from violence is to be conducted on the same principles as those just laid down. If the perineum be not infiltrated, or only to a slight extent, it may not be necessary to make an incision in the perineum. A large gum-elastic catheter, well curved at the extremity, should be introduced along the urethra, and if it can be made to pass the lacerated opening, is to be retained in the bladder. If it be found impossible to evade the rent in the urethra, the only course to be adopted is to pass a grooved staff as far as that point, and by cutting down upon it to lay open the urethra through the perineum. By whichever means the object of carrying away the urine, so as to obviate its being extravasated, is accomplished, punctures or incisions should be made into the infiltrated parts as soon as it is

effected. It has been already observed that in extravasation of urine resulting from the cause under consideration suppuration is more prone to occur than gangrene, and that the sloughing is comparatively inconsiderable. Still, a want of promptness and decision in a case of this kind may be productive of nearly as serious consequences as if it were one of extravasation of urine in connexion with stricture.

When the infiltration of urine depends upon ulceration of the urethra from the presence of a calculus, the foreign body must of course be cut down on, and extracted before any other step be taken.

Rupture of the bladder.—We have seen how rupture of the urethra is produced by stricture, and the serious results that arise therefrom ; but it must not be forgotten that the bladder itself may give way, an event which is inevitably fatal. Happily this casualty is so extremely rare that few cases are on record in which the organ itself and not a mere sac springing from it has burst. The bladder is so extremely expansile, that it admits of being greatly distended beyond its ordinary limits, and in stricture the hypertrophy which the parietes of the organ undergo for the purpose of enabling it to overcome the urethral obstruction, is calculated to diminish much the risk of rupture taking place. Cases, however, are sometimes met with, in which from long continued distention the bladder loses its tone, and in great measure its sensibility ; its parietes become softened, wanting their natural elastic and resisting properties ; under such circumstances it is quite possible, where the

bladder is very full and the stricture close, for rupture of the organ to occur during a violent effort to micturate. In almost all the cases of this kind, however, in which a proper post-mortem examination has been instituted, the rupture has been found to result from gangrene or ulceration at one spot in the bladder itself, or in a sac communicating with it.

The urine may be effused into the areolar tissue of the pelvis, or even into the cavity of the peritoneum, according to the part of the bladder which gives way. In either case the occurrence is betokened by unerring indications. The patient feels as if something gave way, and collapse soon follows. Violent symptoms quickly set in, resulting either from peritonitis, or inflammation and gangrene of the pelvic areolar tissue, and death supervenes in from thirty-six hours to four or five days after the accident. In respect to the treatment of this formidable result of stricture, the surgeon can effect but little. The introduction of a catheter into the bladder, and the administration of opium in such doses as will relieve the pain, which in some cases is excruciating, constitute the only plan that can be adopted. Puncturing the peritoneal cavity or cutting into the space between the bladder and rectum, as has been proposed, can hardly afford any prospect of success.

INDEX.

	PAGE.		PAGE.
Abscess in perineum	161	Causes of stricture	2, 22
varieties of	163	Caustic, application of	114
vesical	171	Chronic urinary abscess	169
Absorption, cure of stricture by..	68	Cloudy urine, import of	27
Allarton's operation	54	Colles's operation for narrowed orifice	121
Ammoniacal urine, import of	28	Complications of stricture	45
Anodynes, value of 90, 94, 103, 144, 216		Concentric hypertrophy of bladder	60
Arnott's method of dilatation	80	Congestion of bladder	65
Atony of urethra	36	Consequences of stricture	58
B.		Constitutional symptoms of stricture	30
Balsams	85	Corpora spongiosa infiltrated	199
Bark in gangrenous fever	215	Cure of stricture by absorption	68
Bladder, abscess of	171	incision	118
atony of	34	Cutting in case of stricture ¶118, 148, 151	
congestion of	65	Cystitis, chronic	84
hypertrophy of	60	from use of instruments	77
irritable	59, 110	D.	
puncturing the	153	De Borsa's operation	54
rupture of	218	Definition of stricture	4
sacculated	61	Diagnosis of stricture	33
Bleeding in case of retention	144	Dieffenbach on perineal fistula	190
Bougies	69	Diffused perineal abscess	167
Bridle stricture	18	Dilatation behind stricture	58, 152
Brodie on opium in case of retention	147	Dupuytren's "vital"	73
perineal incision	123	of ureters	66
sympathetic affections	50	Dilator, Arnott's Fluid	80
of prostate	50	Division of a stricture	118
modification of Stafford's	119	E.	
operation	119	Eccentric hypertrophy of bladder	60
treatment of rigors	94	Emissions, nocturnal	49
views of spasmodic stric- ture	8	Erysipelas of scrotum	207
C.		Excrescences, urethral	20
Calculus, urethral	51	F.	
causing infiltration	201	False passage	104
with fistula	186		

	PAGE.		PAGE.
False passage causing infiltration	205	K.	
Fistula, urinary ..	161, 176	Kidneys affected in stricture ..	87
with urethral calculus	186	Kœllicker's microscopic researches	5
urethro-rectal ..	190		
Fleming on sacculated bladder ..	62	L.	
Fluid dilator, Arnott's ..	80	Lacuna magna ..	41
Force, caution regarding the use of	75, 89, 141	How to avoid the ..	72
"Forcing" a stricture ..	143	Leeching in case of retention ..	145
French conical bougies ..	70	Liston on anasarca of scrotum ..	207
		Lithotripsy	53
		Long stricture	17
G.			
Gangrene from infiltration ..	200	M.	
Gangrenous erysipelas ..	208	Meatus, contraction of ..	20, 121
Gonorrhœa, retention from ..	134	Muscularity of urethra	5
stricture from ..	24		
Gout inducing spasm ..	47	N.	
predisposing to stricture ..	25	Narrowing of meatus urinarius ..	20, 121
Guthrie on spasmodic stricture ..	9	Nitrate of silver in Cystitis ..	85
		Fistula ..	183
H.		O.	
Hemorrhage from urethra ..	97	Objective symptoms of stricture ..	27
Hamilton on urinary fistula ..	184	Obstacles to passage of instrument ..	41
Hancock's anatomical researches ..	5	Operation, Allart's	54
Home on structure of urethra ..	5	Colles's	121
use of caustic	114, 117	De Borsa's	54
Hunter on cause of stricture ..	3	Syme's	125
muscularity of urethra ..	5	of dividing a stricture ..	118, 122
Hunter on the use of caustic ..	114	of lithotripsy	53
Hutton's "railroad catheter" ..	140	of paracentesis vesicæ ..	153
Hypertrophy of bladder ..	60	Opium in gangrene	216
prostate gland ..	51	hemorrhage	103
		rigor	94
I.		rupture of bladder	219
Immediate cause of stricture ..	22	spasm	90
Impediments to cure by absorption ..	88	Orchitis from use of instruments ..	77
use of an instrument ..	41	Organic stricture	15
Incision of perineum ..	122, 173	Retention from ..	135
Incontinence of urine ..	29		
Infiltration of urine ..	192	P.	
into corpus spon-		Paracentesis vesicæ	153
giosum ..	199	Passage, False	104
pelvis ..	198	Pelvis, Infiltration into	198
from urethral calculus ..	201	Perineal abscess	161
Traumatic	203	incision	122, 148, 151
Inflammatory stricture	11	Permanent cure, Question of ..	83
Injections inducing stricture ..	24	stricture	4
Injuries causing infiltration ..	203	Phosphatic sediment, Import of ..	28
Instruments, obstacles to the use of ..	41	Prostate gland, Hypertrophy of ..	51
Intermittent character of symptoms ..	30	Pain and swelling of ..	50
Iron in cases of spasm	145	Prostatic ducts dilated	42
Irritable bladder	59, 110		
urethra	47, 92		

INDEX.

223

R.	PAGE.		PAGE.
Railroad catheter, Hutton's	140	Treatment of retention ..	.. 138
Rational symptoms of stricture ..	27	stricture ..	.. 67
Rectum, Abscess opening into	168	urinary fistula ..	.. 181
Puncture through the ..	154	True urinary abscess ..	.. 166
Remittent fever, sympathetic ..	31	Turpentines ..	.. 85
Remote causes of stricture ..	22		
Renal complications ..	87		
Resiliency of a stricture ..	83		
Results of stricture ..	58		
Retention of urine ..	133		
Rigors ..	77, 93, 197		
Rupture of bladder..	218		
S.			
Sacculated bladder..	61	Unyielding stricture ..	.. 90, 112
Scoop lithotrite ..	53	Ureters dilated ..	.. 66
Serofula predisposing to stricture	25	Urethra, Hemorrhage from the ..	.. 97
Scrotum, Erysipelas of ..	207	Inflammation of ..	.. 124
Shower bath..	96	irritable ..	.. 92
Site of organic stricture ..	21	Urethral calculus ..	.. 52
Sloughy abscess of perineum ..	170	Fistula with ..	.. 186
Spasm ..	4, 48, 88, 133, 145	Infiltration from ..	.. 201
Retention from ..	133	Urethritis, Strinous ..	.. 14
Spermatorrhoea ..	49, 93	Urethro-rectal fistula ..	.. 190
Stafford's mode of dividing a stricture	118	Urinary abscess ..	.. 166
Stimulants in fever of gangrene ..	215	fistula ..	.. 161, 176
Stone ..	52	intermittent ..	.. 31
Stricture, causes of ..	2, 22	Urine, Incontinence of ..	.. 29
Complications of ..	45	Infiltration of ..	.. 192
Consequences of ..	58	Retention of ..	.. 133
Diagnosis of ..	33	Uva ursi in chronic cystitis ..	.. 85
Treatment of ..	67	Uvula vesicæ enlarged ..	.. 43
Struma predisposing to stricture	25		
Strinous urethritis ..	14		
Subacute perineal abscess ..	164		
Suppuration of prostate ..	50		
Supra-pubic puncture of bladder	155		
Sync's perineal operation..	125		
Sympathetic abscess ..	163		
Symptoms of infiltration ..	193		
retention ..	136	Wade's use of caustic potass ..	.. 115
stricture ..	25	Wakley's contrivance ..	.. 78
T.		Warm bath in case of retention ..	.. 144
Tapping the bladder ..	153	Whateley on potassa fusa ..	.. 115
Temporary stricture ..	4	Wound of urethra, Infiltration from ..	.. 203
Traumatic infiltration ..	203		
Treatment of infiltration ..	211		
perineal abscess ..	173		
Y.			
		Yielding stricture 68
Z.			
		Zinc, Valerianate of 96

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